A Dissertation on

PREVALENCE OF RAISED IgE LEVELS AND ABSOLUTE EOSINOPHIL COUNT IN BRONCHIOLITIS IN CHILDREN AGED 2 MONTHS TO 2 YEARS IN TERTIARY CARE CENTRE

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INSTITUTE OF SOCIAL PAEDIATRICS
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CHENNAI

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DECLARATION

I, **Dr.SINDHU BHARATHI S** solemnly declare that the dissertation titled **"**PREVALENCE OF RAISED IgE LEVELS AND ABSOLUTE EOSINOPHIL COUNT IN BRONCHIOLITIS IN CHILDREN AGED 2 MONTHS TO 2 YEARS IN TERTIARY CARE CENTRE"**"** was done by me at **Government Stanley Medical College during 2013- 2016** under the guidance and supervision of my chief **Prof. S.SHANTHI M.D, D.C.H.**

The dissertation is submitted to **The Tamilnadu Dr.M.G.R Medical University** towards the partial fulfilment of the rules and regulations for the **M.D. Degree Examination - BRANCH VII - in Pediatrics**.

Place : Chennai

Date:

Signature of the candidate,

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CERTIFICATE BY THE INSTITUTION

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ABBREVIATIONS:

IgE	Immunoglobulin E
RSV	Respiratory syncytial virus
TH	T helper cells
MHC	Major Histocompatibility complex.
AEC	Absolute eosinophil count

PREVALENCE OF RAISED IgE LEVELS AND ABSOLUTE EOSINOPHIL COUNT IN BRONCHIOLITIS IN CHILDREN AGED 2 MONTHS TO 2 YEARS IN TERTIARY CARE CENTRE

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ABSTRACT

TITLE: Prevalence Of Raised IgE Levels And Absolute Eosinophil Count In Bronchiolitis In Children Aged 2 Months To 2 Years In Tertiary Care Centre.

INTRODUCTION: Bronchiolitis is most common respiratory infection in children less than 2 years. The host inflammatory response contribute to the pathophysiology of bronchiolitis.Most common long term complication is wheeze although the relation remains unclear

AIMS AND OBJECTIVE: The Primary outcome was To Measure Serum IgE levels and Absolute Eosinophil count in patient with bronchiolitis and obtain the prevalence of raised values and To obtain RSV Antigen assay in these patients as one of the etiology for Bronchiolitis .The Secondary outcome is To find out the Proportion of occurence of wheezing among the IgE positive patient.

CONCLUSION:.

The study thus conducted has illuminated us on the following facts about bronchiolitis.

With regard to the age distribution, higher incidence of bronchiolitis is seen in the infant population of 2 to 6 months .Higher incidence is seen among the male population compared to females.

The prevalence of raised Absolute eosinophil count was 28.1 %. They were correlated with age and is found to have high statistical significance.

The prevalence of IgE levels in bronchiolitis (38.5%) but was not of any statistical significance.RSV antigen was 35.4 % as a causative factor and had high statistical significance

The proportion of occurence of wheeze among IgE Positive patient was 45.9% . Out of raised IgE levels in 37 patient 17 had wheeze. Among 27 raised absolute eosinophil levels 10 had wheeze on follow up. Among the bronchiolitis children with normal values of IgE and Absolute eosinophil count 5 had wheeze on follow up. Out of the subjects who have both IgE and absolute eosinophil count raised 3 had wheeze on follow up.

KEY WORDS: Bronchiolitis, IgE, Absolute eosinophil count.

INTRODUCTION

Definition:

The American Academy of paediatrics [7]and Europian respiratory society defines bronchiolitis as "A constellation of clinical signs and symptom including viral upper respiratory prodrome followed by increased respiratory effort and wheeze in children less than 2 years "

Bronchiolitis is characterised by acute inflammation,necrosis and edema of small airway with increased mucus production.

Epidemiology :

Bronchiolitis in children is a most common lower respiratory infection diagnosed clinically. It is usually caused by infection of lower airways (bronchioles) by virus. Bronchiolitis occurs in 75% of the children less than 1 year of age.90% of bronchiolitis occurs in first two years of life. World heath organisation has estimated the RSV burden globally as 64 million cases and 150000 deaths every year.[1]

Many virus cause bronchiolitis with Respiratory syncytial virus being common.Sixty to seventy five percent of bronchiolitis is caused by Respiratory syncytial virus (RSV). Epidemiology of RSV has many unusual characteristics. They infect children nearly in first year of life with the peak incidence in 2 – 8 months. Its is the only virus which cause most severe respiratory disease in the first month of life when there is antibodies from the mother.[1]

These infection doesnot grant long term immunity with reinfection common through out life.

These children present with respiratory distress, irritability, cough, poor feeding and apnoea in very young.These features along with auscultatory findings of crepitations and wheeze combine to make the diagnosis of bronchiolitis. Bronchiolitis is one of the common cause of hospitalisation. [2]

In most of the children the disease is mild and self limiting in about four to seven days. But in some cases it may cause severe illness. The most susceptible ones are those with preterm delivery, underlying cardiac or respiratory condition[2]. About 2 to 3 % of children require hospitalisation.

In India the most common cause of morbidity is lower respiratory tract infection and bronchiolitis is most common cause.

Etiology :

The most common cause of bronchiolitis is Respiratory syncytial virus. This is followed by Enterovirus (17%), Metapneumovirus (7%), Adenovirus. More than one virus is seen in about 30% of cases.

Respiratory syncytial virus:

RSV virus is Paramyxovirus of genus pneumovirus . It is a medium sized RNA virus. The genome is composed of 10 viral proteins and 15000 nucleotides.

- The nucleocapsid N protein tightly encapsulates the genome which along with phosphoprotein P and polymerase subunit L forms minimum

unit for RNA replication.RSV encodes three surface envelope proteins, the attachment protein , fusion protein and a small hydrophobic protein. There are two protein G , glycoprotein and F fusion protein. G protein produces Th2 response and F protein Th1 response. There are two major RSV strains (subgroup)A and B.They are distinguished by variations in G protein.There is controversy over which subgroup caused more severe symptoms .

Respiratory syncytial virus is one of the most important cause of bronchiolitis. In hospitalised patients RSV accounts for 60 to 90 % of lower respiratory tract infection. Severe infection occur in those who are less than 6 months of age. Underlying conditions like prematurity, bronchopulmonary dysplasia, immunodeficiency, congenital heart disease contribute to severity of disease.

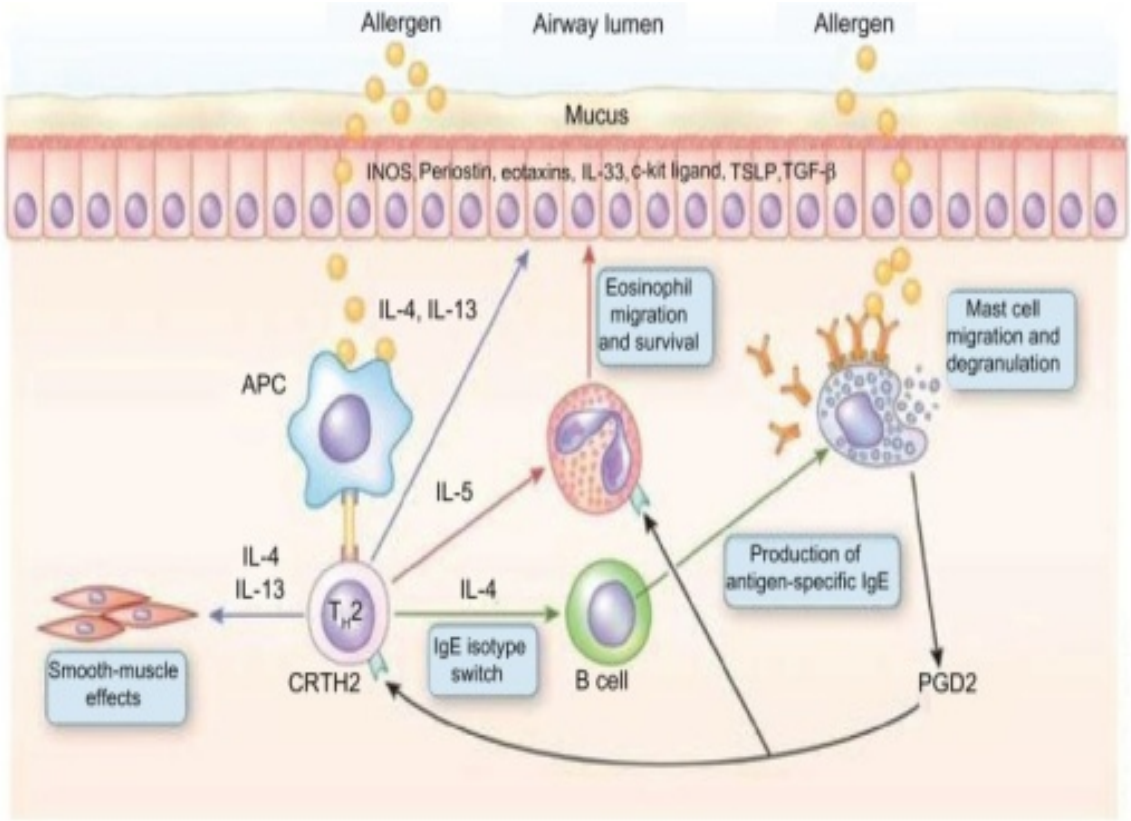
Intensive care is needed for about 15% to 30% of RSV infections. Due to respiratory failure , apnoea 7% to 21% of hospitalised patient needs mechanical ventilation [7] .Mortality rate is very low ranging from 1% to 3% . But the rate increases to 5 to 8% in congenital heart disease to 13% in chronic lung disease.

According to CDC , Respiratory syncytial virus infects breathing passages and lungs. It can be serious especially in infants and older adults. It is most common cause of bronchiolitis in children which is inflammation of smaller airways and can also cause pneumonia. When infants are exposed to RSV for first time out of 100 , 25 to 40 have signs and symptoms of

bronchiolitis . 5 to 20 of 1000 will require hospitalisation. Most will recover in 1-2 weeks but in infants with weekened immune system can continue to spread infection for 1 to 3 weeks.

Whether RSV infection predisposes to wheeze is question for decades. Some prospective study have suggested that RSV infection predisposes to blood eosinophilia and airway hyperreactivity leading to development of wheeze. Some congenital trait like increased immunological response, small airway, increased airway reactivity also contribute to illness.

RSV IMMUNE RESPONSE:



From the upper respiratory tract the infection spreads to lower respiratory tract. The resulting inflammation of bronchioles is characterised by infiltration of inflammatory cells and odema of mucosa and adventitia. The viral replication result in production of chemokines, cytokines and cause recruitment of eosinophils and neutrophils.

Macrophages present Viral particles causing bronchiolitis in association with MHC class II to CD4+ T lymphocyte which in turn produce cytokine production.TH1 cells are involved in cellular reponse. TH2 cell cause induction of eosinophilia and immunoglobulin production such as IgE.

Overproduction of cytokines released by Helper 2 T lymphocytes is responsible for illness especially interleukin 4 and 5. These are responsible for wheeze.Interleukin 4 and 5 cause migration of eosinophil and also increases IgE production.[11]

Th2 cell activation attracts eosinophils. Virus induced eosinophilia can also occur.

Within 2 days of infection cell bound IgE are detected. The titres of IgE are predictive of recurrant wheezing. This is possibly due to similarities in inflammatory response to allergen exposure and virus infection.

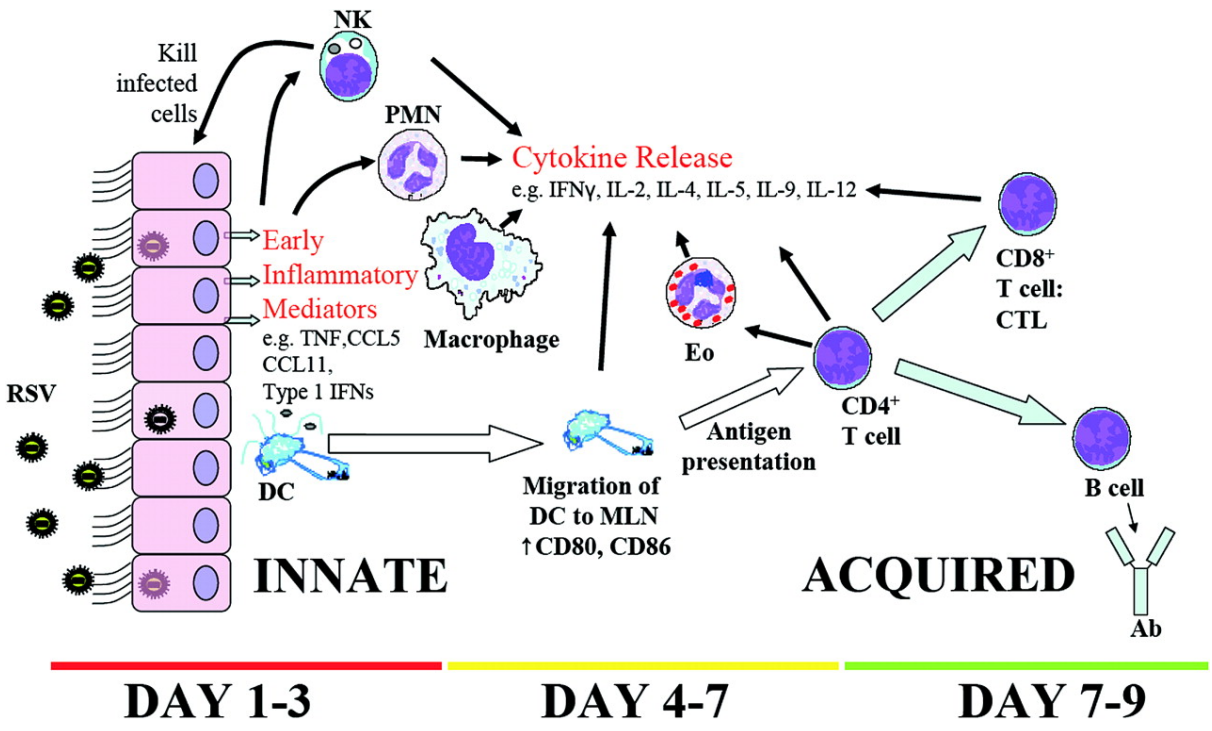
Long term effects of RSV by pulmonary function test reveal restrictive pulmonary disease and severe airway resistance.

Inhibition of Interferons:

Interferons believed to have antiviral properties,Non structural protein inhibit IFN-alpha/beta,Inhibition of IFN-gamma causes enhanced IgE production

Interleukins & Chemokines:

Infection induces expression of chemokines which mimic RSV glycoproteins and also recruit monocytes, eosinophils, & neutrophils ,IL-8 levels positively associated with severity.



Diagnosis :

Diagnosis of bronchiolitis is mostly clinical based on presentation , age, seasonal and clinical characters.

Few investigations are required particularly to exclude other diagnosis (pneumonia, congestive cardiac failure) and to know the viral etiology.

The American Academy of paediatrics[7] has given clinical practical guideline for diagnosis of bronchiolitis. This applies to children from 1 to 23 months of age. The key action statements are as follows,

1a. clinicians shoud diagnose bronchiolitis and assess the disease severity based on history and physical examination. (recommendation strength : strong recommendation)

1b.Clinicians should assess the risk factors for severe disease such as age less than 12 weeks, a history of prematurity , underlying cardiopulmonary disease, or immunodeficiency , when making decisions about evaluation and management of children with bronchiolitis.

1c. When clinicians diagnose bronchiolitis on the basis of history and physical examination, radiographic or laboratory studies should not be obtained routinely.

The course of bronchiolitis is variable ranging from transient events like apnoea to severe respiratory distress. History is important.

When assessing bronchiolitis one should consider that its more common in age group less than 2 years, peaking between 3 to 6 months. The symptoms usually peak at around 3 to 5^{th} day of illness. In 90% of the patients the cough settles within 3 weeks.

Infants usually present with Prodromal coryza,Cough ,Tachypnoea or respiratory difficulty or both.Crepitation or wheeze on auscultation or both. Fever occurs in 30 % of the patients usually less than 39 degree Celsius.In infancy less than 6 weeks it may present as apnoea without other clinical sign.

If the patient has persistant high grade fever,crackles or persistant wheeze alternate diagnosis such as pneumonia or early onset asthma should be considered.

If the child has signs of exhaustion or poor respiratory efforts or apnoea suspect impending respiratory failure. The children need intensive care.

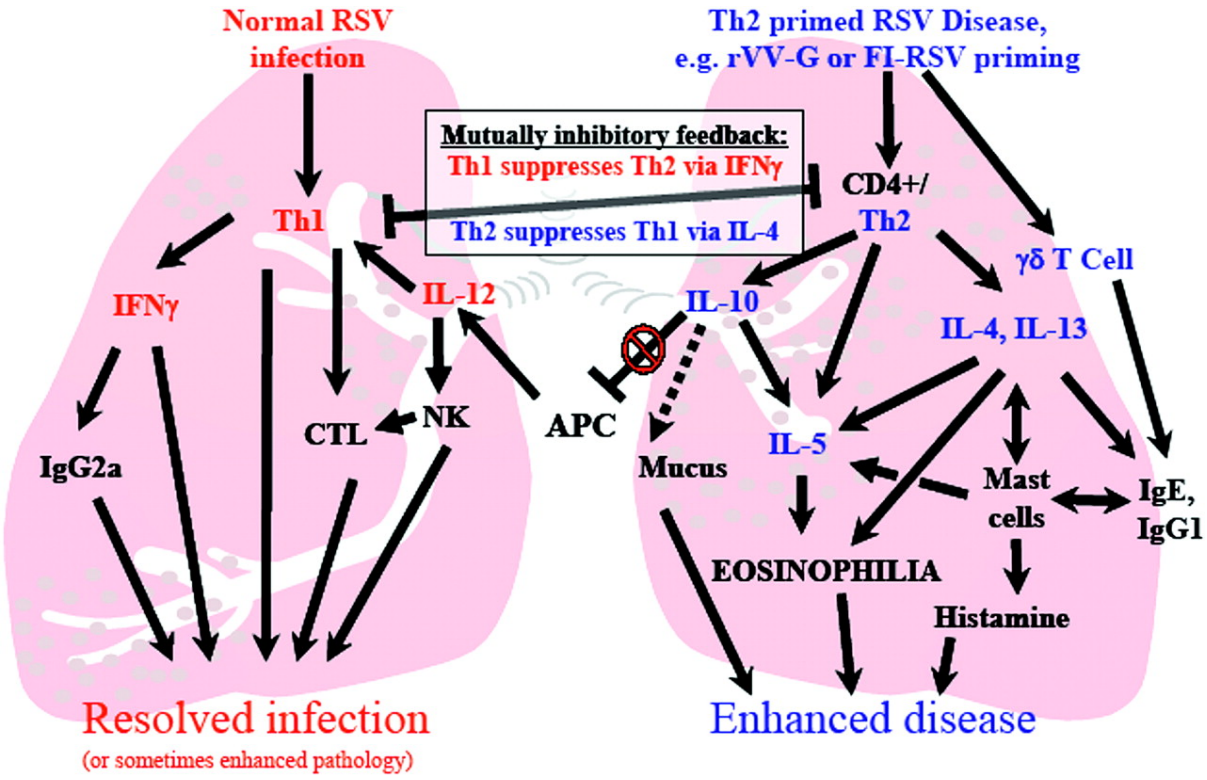
Bacteriological and virological testing:

Rapid virological testing may cause reduction in unnecessary intervention, decrease the hospital stay , ,microbiological test and antibiotic use. It is also used to prevent nosocomial infection.

Immunoglobulin E:

IgE is antibody specific to mammals. When our immune system is exposed to environmental allergen or infectious particle which it identifies as potentially harmful it produces IgE . These Ig binds with antigen resulting in inflammatory response for getting rid of infectious particle. If this Ig is produced in overabundance the next encounter with the allergen will produce more harm than with the first exposure.

Severity of RSV Infection is Determined By Inhibition of certain interferons ,involvement of innate immune system,interleukins and chemokines,coinfection with other respiratory viruses.



Eosinophils :

Since eosinophils have antiviral activity RSV infected epithelial cells upregulate the production of eosinophils. They also play importantant role in long standing inflammatory reaction in bronchiolitis.

Absolute eosinophil count measures no of eosinophils which are white blood cells. More than 500 cells per microlitre of blood is considered eosinophilia. High count is related to allergic reactions.

This study intends to know prevalence of serum IgE level and absolute eosinophil count in bronchiolitis and to estimate the occurance of wheeze in those with raised Ig E levels.

REVIEW OF LITERATURE

Etiology of Bronchiolitis:

According to Consensus conference on acute bronchiolitis; In population less than 2 years bronchiolitis forms 1-3.5% of admissions and 1-2% of emergency admissions among age 3-6 months. Prematurity chronic lung disease and congenital heart disease are most common risk factor. [2]

Other risk factor is poor socioeconomic status, male,exposure to smoke. Other virus involved are Rhinovirus, Metapneumovirus,Adenovirus,Parainfluenza and Bocavirus.

Immune response in bronchiolitis:

According to Wright, M and Peidimone et al [26] there is involvement of Cell-mediated CD4+ & CD8+ cells and helper cells Th1 and Th2 . RSV specific IgE is cell bound to the mucosal epithelial cell of the respiratory tract ,its amount, persistency and duration are important in determining the severity of bronchiolitis and wheezing. IgE combines with mast cell to cause inflammatory mediator release which in turn mobilize other cells and cause release of eosinophil degradation products and cytokines.

RSV: Co-infection:

According to Thornburn K et al[63] , Among 165 PICU admissions with RSV bronchiolitis ,42% were mechanically intubated patients in PICU with lower airway secretions positive for bacteria with organisms like S.aureus,M.catarrhalis, H.influenza,S.pneumonia and S.Pyogens.

According to Vincencio 2010 et al severe infection with bronchiolitis is multifactorial and is related to host. Environment and virus. Low birth weight children less than 3 months, overcrowding smoking contribute to severity. RSV produce more severe disease than other virus.

Since 1950s , bronchiolitis is used as a diagnosis for a specific clinical symptom complex of respiratory system. After a short prodrome of upper respiratory system typical signs of bronchiolitis like wheezing, tachypnoea, respiratory distress ,poor feeding and hyperinflated lung fields occur. Fine crepitation is heard on auscultation (Hall 2001[99], Simoes 1999, Fitzgerald and Kilham 2004, AAP 2006).Some studies restrict bronchiolitis to RSV cases only(Siguris[21] 2002, Schauer et al 2002)

Mullins JA et al [21]Greenough et al [23]and Parrot RH et al[24] studied the epidimelogy ,seasonal timing of bronchiolitis.Studies on infants admitted for bronchiolitis found 60% to 75% children have positive test for RSV. One third of the infants are found to have co infections.

Among the viruses which cause lower respiratory tract infection , respiratory syncytial virus is most common virus (Calvo et al.[38]2010, Manoha et al 2007, Mansbash et al 2007, Marguet et al 2009,Jartti et al 2004, Midulla et al [55]2010)

RSV virus has annual outbreaks during rainy season in tropical climates and during winter in temperate climates.

According to Jartti et al [55] those children with first episode of wheeze are considered for diagnosis of bronchiolitis.

Nair H,Nokes DJ et al [73]conducted a meta-analysis on global burden of RSV bronchiolitis.According to them RSV incidence is high causing substantial impact in family and society . In 2005, RSV bronchiolitis affected 34 million children globally under five years of age and about 3.4 million required hospitalisation.Mortality of RSV Infections was around 66000 with 99% of which occurs in developing countries.

According to Jansen AJ, Sanders et al[74] ,Netherlands the annual number of hospitalisation due to RSV and primary care visit are 2400 and 48000 for children less than two years and 300 and 35000 for children 2-4 years respectively.

Roosevelt GE Clarke et al [26] and Shay[3] DK et al studied bronchiolitis associated hospitalisation and mortality .About 87% of the children are infected by 18 months and virtually all children are infected by 3 years of life. Infected infants develop upper respiratory tract infection. About 40 % develop lower

respiratory tract infection . 1-2% of infants require hospitalisation. In these mortality can reach 10 %.

According to Shay DK Holman et al [3]reinfection with RSV occurs throughout life although recurrent bronchiolitis is unlikely.RSV infection unusual in less than 1 month and more than 2 year of age and more common among 2- 5 months of age.

Scottish Intercollegiate Guidelines Network [2] gives diagnostic value of clinical characteristics:

Effects of Age:

There is no evidence for age as determining feature of diagnosing bronchiolitis. Its more common between 3 to 6 months of age . Its more commonly diagnosed less than 2 years of age .Infections are more severe in premature infants and neonates.

Fever ,Rhinorrhoea and cough:

Dry wheezy cough along with nasal symptoms is more characteristic in bronchiolitis. High fever is uncommon. But infants may have fever or history of fever.

Dyspnoea :

Increased rate of respiration is most common symptom in bronchiolitis. Subcostal retraction and intercostal retraction are commonly seen in bronchiolitis. They may have typically hyperinflated chest which may distinguish from pneumonia.

Feeding difficulties:

Poor feeding may be one of the common criteria for admission, but its not needed for diagnosis.

Crackles or crepitation:

Inspiratory crackles heard all over the lung fields is common in bronchiolitis. Viral induced wheeze is considered in infants with only wheeze.

Apnoea :

In premature babies , in low birthweight babies and in very young babies apnoea may be presenting feature.

Investigations :

Acute bronchiolitis is a clinical diagnosis. When diagnostic uncertainity exist investigations are performed for subsequent management. These investigations include pulse oximetry, blood gases, rapid virological and bacteriological testing, full blood count, C reactive protein,chest x ray etc.

Pulse oximetry:

Low oxygen saturation significantly influenze the physician to admit or discharge the patient. Low oxygen saturation is associated with severe disease. Infants with saturation <92% require admission and inpatient care. Infants with saturation > 94% is fit for discharge.

Blood gases:

Usually not indicated. Carbon di oxide level will determine the referral to higher intensive care unit.

Chest x ray:

Chest x ray is usually not recommended in bronchiolitis. In most of the cases it is usually normal. It is usually indicated where there is atypical course or uncertainity in diagnosis. The finding in chest x ray may vary from normal to hyperinflation, atelectasis or pulmonary infiltrates.

Bacteriological and virological testing:

Rapid virological testing may cause reduction in unnecessary intervention, decrease the hospital stay , microbiological test and antibiotic use. It is also used to prevent nosocomial infection

Comparing age vs bronchiolitis :

According to Crowe jr and Williams 2003 et al [101]Immune development requires interaction of genetic, molecular and cellular components which may act differently in different infection and different age. The protective antibody responses to viral glycoprotein develop gradually over first 6 months of life, reflecting developmental maturation of immune system at birth. The young infant mount poor immune responses. This is why they require hospitalisation when they acquire respiratory tract infection. Majority of bronchiolitis infection occurs in age group less than 3 months.

Akdis et al and Miller et al [18] studied immunological reponse in RSV. According to him RSV infects respiratory cell and involve macrophages which respond by producing cytokines. The cytokines is age dependant . There is significant difference in production of cytokines among < 6 months and > 6 months.(Hoebee et al 2004)[100]. Th 2 cytokines produce IL -4, IL- 5,9 , which in turn produce IgE(Ozdemir et al 2009)[102].

Immune response clear the infection and limit the spread of virus. According to Hallman et al [106] the earliest response to infection is innate immune system . These antigens of the microbes are processesed and form complex with major histocompatability complex on the surface of the macrophage. They stimulate the T cell receptors, which in turn produce cytokines , recruit eosinophils etc.

Viral infection cause bronchial constriction by neural reflux (Bowerfind et al 2002) [104]indirectly or directly by interferon production. Interferon gamma

production and strong pro inflammatory response may be one of the reason for recurrant wheeze after viral infection

During one year follow up post bronchiolitis increased IL10 response was associated with subsequent increased risk of wheezing.(Bont et al 2000)[105].

According to Chatterjee et al [68] 2000, Karjalainen et al 2003, Lim et al 1998, IL -10 is one of the important factor produced during viral infection and is related to wheezing pathogenesis, IgE levels and eosinophil levels.PCR assay should be interpreted with caution because any prolonged viral shedding from undetected previous illness may be detected by the assay.

According to Matti karpoori et al [66]susceptibility to bronchiolitis and post bronchiolitis wheeze has been discovered to be multifactorial which includes host , environment and virus itself.

Domochowski HP Rosenberg et al [88] studied the immunopathogenesis of respiratory syncytial virus infection. There is evidence of eosinophilic degranulation in lung parenchyma and nasopharynx during RSV infection. The secretion of eosinophilic cationic protein is associated with wheezing.

Harrison AM bonvilli et al studied eosinophil recruitment and degranulation and RSV induced chemokine recruitment . According to them Eosinophil and eosinophil RNA ase have antiviral activity. Eosinophil chemoattactants RANTES and MIP – 1 are upregulated by RSV infected respiratory epithelial cells.

Smyth RL, Reinze PM et al [103]studied activation of cellular immunity and wheezing after bronchiolitis. According to them there is long standing inflammatory reaction following RSV infection.

FeiginRD ,Cherry JD et al [88]studied RSV infectious disease. They conducted clinical trials of formalin inactivated vaccine for RSV. Increased mortality and morbidity was observed in infants on subsequent exposure.Post mortem examination showed massive pulmonary eosinophilic infiltrates. This gives strongest evidence for involvement of eosinophils in RSV bronchiolitis immunopathogenesis.

Stein RT sherril et al [79] studied bronchiolitis and wheeze found IgE in respiratory secretions of those recovering from bronchiolitis. In acute bronchiolitis level of IgE was high which correlated with degree of hypoxia.

Korpi matti et al [66]did their study to determine clinical characteristic of RSV antigen associated with wheezing. In their study 100 children were admitted with wheezing 24 children showed RSV infection with raised IgE levels and blood eosinophilia.

David a albert [27]et al studied correlated respiratory illness with serum IgE levels. According to them wheezing illness was greater in children with raised IgE levels.

Siguris N Bjarnason et al [28]did a study on IgE antibodies and asthma after respiratory syncytial virus. According to them positive IgE test was found in 14 out of 44 RSV children. They also concluded that RSV is one of the risk factor for sensitisation to allergen and asthma in subsequent 2 years.

Massimo vincenzo et al [29]in his study concluded that serum IgE levels and eosinophils were elevated during bronchiolitis and they developed wheeze on follow up. The risk for development of wheeze was high with eosinophil level > 8 microgram compared to those with < 8 microgram ($p < 0.0001$).

Sabina alenka et al [30] concluded that IgE antibodies were detected in sera of 6 RSV positive children with increase in CD23 +B cells.According to them CD4lymphocytes were Th2 cells that produces IL4 that plays essential role in synthesis of IgE. These cells drive B cells to produce IgE by physical interaction and cytokine production.

Yechiel becker et al [35] in their study concluded that there is increase in Th2 cytokines and IgE levels in RSV infected patients suggesting allergy like condition is produced during the infection.

Mark Grenvilli et al [36]study has shown that IgE can be detected in both upper and lower respiratory tract of infants with RSV positive bronchiolitis. They have also shown IgE in respiratory tract of two patients intubated for RSV bronchiolitis.

Robert williver et al [37] studied the predictive value of raised IgE levels following bronchiolitis and subsequent wheeze. According them 70 % of the infants with raised IgE level showed subsequent wheezing than in 20 % of those who showed normal IgE levels.

John F prince [38] et al studied effects of bronchiolitis in infancy. According to his study 85% of bronchiolitis case showed RSV positivity . 75% of the children showed recurrant lower respiratory tract infection . Many continued to have hyperinflation of lung and bronchial hyperresponsiveness. IgE antibodies and leukotrienes were found in higher concentration in children with bronchiolitis.

Robert C williver et al [40] studied IgE after RSV infection . He concluded that Ig E was found during acute phase of bronchiolitis. Subsequent production of chemical mediators of bronchospasm is responsible for pathogenesis of the disease. Recurrant episodes of wheezing is explained by persistence of IgE in the respiratory tract.

According to Weliver et al [41]the patients with bronchiolitis who wheezed had greater concentration of IgE than those without obstruction. They also had greater concentration of histamine. Prospective monitoring also showed that

these patients with high titres of IgE developed wheezing on follow up. Family history of atopy and positive skin test also contributed to recurrant wheezing.

Busse Milner Morgan[44] et al explained the phenomenon that viral infections cause epithelial injury, production of virus specific antibodies, mediator release and airway hyperresponsiveness. The infection by virus affect alveolar and lung development ,cause airway remodelling and thus predispose to wheeze.

The association between viral bronchiolitis and wheeze was reported by various authors,Schauer et al 2002 reported bronchiolitis at 4 months and followed them for 6-9 months when they developed wheeze. Cifuentz et al 2003 followed for 11 months from 3.5 months of age to report wheeze. They also reported that wheezing episodes and asthma shared genes, there were several polymorphism in cytokine gene in asthma which were related to RSV severity.

Shein et al [47]conducted a study on blood eosinophilia. According to him 20 % of children with bronchiolitis had positive eosinophilia. In his study positive eosinophilia was associated with increased duration of hospital stay of these bronchiolitis patient and increased mechanical ventilation.

Calvo gracia et al [48]studied eosinophilia in bronchiolitis and their subsequent development of wheeze. According to them bronchiolitis patient

had raise in eosinophils > 1%. Their first five year follow up showed that about 35.3% developed persistant wheeze

Pifferi Ragazzo V et al [49]studied eosinophils in RSV bronchiolitis. According to them among forty eight people who enrolled wheeze was more common in those who had raised eosinophils.

Stephen H Polmer et al [43]studied IgE in bronchiolitis. They measured IgE in 32 subjects. According to them serum IgE was elevated in 35% of the subjects. This supported the concept of heterogenous etiology of bronchiolitis. They also suggested that these bronchiolitic patients had subsequent risk of developing respiratory allergies.

Murtuza A Khan Michel et al [51] studied IgE in bronchiolitis. Out of 95 samples 65 showed raised IgE in acute phase.

Welliver et al [42]studied RSV IgE titre in nasopharyngeal secretions. According to them elevated level of IgE were predictors of risk of developing wheeze in later life.

Roman M Calhoun et al [87]studied the response of Th2 to RSV. According to them Th2 response is triggered during viral infection. These Th2 cells secrete IL 4,5,6. These interleukin promote eosinophilia and immunoglobulin E

synthesis. It is also hypothesised that increase in serum IgE is indirect marker of Th2 synthesis in acute broncholitis.

Garofalo R dorris et al [85] studied eosinophil count in relation to severity of bronchiolitis. According to his study eosinophil count were significantly greater in patients with bronchiolitis than those with upper respiratory tract infection. The peripheral eosinophil count is suppressed in viral infections although the effect is overcome in patient with bronchiolitis. Degranulation of eosinophils is related to severity of bronchiolitis.

Viral infections suppress peripheral blood eosinophil counts in infants greater than two months of age, although the effect is somewhat overcome in patients with bronchiolitis. The form and severity of bronchiolitis is much more strongly related to degranulation of eosinophils in the respiratory tract than to peripheral blood eosinophil counts.

John Henderson Tom N et al [54] did a longitudinal cohort study on RSV bronchiolitis. They admitted 150 patients with RSV bronchiolitis. The prevalence of wheeze was 28.1% in RSV group compared to 9.6% in control group.

Paolo M renzi Jean et al [55]studied cellular immunity and Th2 response after bronchiolitis. They studies 26 infants without any comorbitidies admitted with

bronchiolitis. They found increase in blood eosinophils and CD4 in patients with bronchiolitis. The interleukin 4 levels were also raised. These values were more in those infants who wheezed than others. They concluded that bronchiolitis is associated with cellular immunity and Th2 response.

Dimova-Yaneva et al [56]studied eosinophil activation in bronchiolitis. In their study they took 78 infants with RSV bronchiolitis. They measured cystine leukotrienes and eosinophil by enzyme immunoassay and fluroimmunoassay. They identified eosinophils from 51 out of 78 assays.

Midulla , Scagnolari et al [70] studied the prevalence of 14 viruses in infants with bronchiolitis. They studied the demographic and clinical profile of bronchiolitis caused by RSV virus, Human bocavirus and Rhinovirus. They concluded that major pathogen responsible for bronchiolitis is RSV . Recent study conducted in tertiary care centre in spain revealed that RSV is main causative agent for bronchiolitis accounting for 62.7% of cases. They also concluded that RSV positive subjects had longer duration of stay in hospital ,had frequent PICU admissions ,required oxygen and caused more illness than other viruses.

LiuXiaoMei et al [78]detected IgE levels in bronchiolitis.During the acute stage of bronchiolitis the levels of serum IgE was higher than in control subjects. The IgE levels detected was statistically significant.They also concluded that the incidence of wheeze was higher in bronchiolitis patient than without bronchiolitis.

According to Tucson children respiratory study [84] the most common respiratory infection was RSV and lower respiratory tract caused by RSV is most common risk factor for subsequent development of wheeze on follow up upto 6 years.

According to Regnier and Huels [82]conducted a meta- analysis and concluded that the risk of wheeze after bronchiolitis decreased with age.

According to Martinez FD Solomon et al [80]and Turner SW et al increased blood eosinophil count during bronchiolitis is associated with bronchial hyperreactivity. They also concluded that these Th2 dominated response of increased eosinophils and bronchial hyperreactivity could be a risk factor of asthma.

Kostas N. Priftis, Athina Papadopoulou [90] studied eosinophil and IgE in acute bronchiolitis. They concluded that IgE levels did not raise significantly in study subjects compared to control subjects. The production of IgE is a type 2 cytokine response produced by stimulation of RSV infection.The mild raise in eosinophil level which was statistically significant in their study may be attributed to the antiviral nature of eosinophil as they are markers of tissue inflammation.They also suggest that raise in eosinophil may also depend on history of atopy. This study was supported by Pifferi et al[49] .These children face recurrant lower respiratory tract infection which is considered as post bronchiolitic wheezing and typically cannot be labelled as asthma.[90].

According Welliver RC Duffy et al,Sung RY et al,Legg ,Hussain et al [91,92]studied IgE levels and cytokine response. The CD23 levels representing raised IgE levels are raised in their study.

According to Everald et al [93] ,could not find any significant difference in study group in IgE levels and bronchiolitis probably because of taking the measurement early in the course of disease.

Fitch et al found no difference in eosinophil level and smoking but maternal smoking had a dose dependant relation.[94,95]

AIMS AND OBJECTIVE

Primary outcome:

1. To Measure Serum IgE levels and Absolute Eosinophil count in patient with bronchiolitis and obtain the prevalence of raised values.

2.To obtain RSV Antigen assay in these patients as one of the etiology for Bronchiolitis

Secondary outcome:

To find out the Proportion of occurance of wheezing among the IgE positive patient.

JUSTIFICATION OF STUDY:

Bronchiolitis is most common respiratory infection in children less than 2 years. Infection cause significant morbidity in children and adults but more severe in children less than 1 year due to low immunity and smaller airways. The host inflammatory response contribute to the pathophysiology of bronchiolitis

Abnormal T cell response in bronchiolitis may cause increase in IgE production. Eosinophil levels also raise due to cytokine response and antiviral action. Studying the raised levels of Absolute eosinophil count and Ig E helps us to know the prevalence of these in bronchiolitis.The measurement of these helps in identifying these bronchiolitis subjects as high risk of developing subsequent allergies.

From this study the prevalence of Absolute eosinophil count and IgE levels in bronchiolitis are studied. These measurements may be of value in identifying those bronchioltic children at high risk for the subsequent development of wheeze and other respiratory allergies.

METHODOLOGY:

STUDY CENTRE:

Department of Paediatrics,

Stanley medical college, Chennai

DURATION OF STUDY: August 2014 to April 2015

STUDY DESIGN: Cross sectional study

INCLUSION CRITERIA:

All patients aged 2 months to 2 years admitted in our hospital for treatment of first episode of bronchiolitis were included.

EXCLUSION CRITERIA:

- Previous history of wheezing/ use of bronchodilators
- Preexisting lung disease
- Bronchopulmonary dysplasia
- Previous hospital admissions with respiratory tract illnesses
- Chronic respiratory illness
- Congenital heart disease / anomalies of chest, lung and heart
- Pre-existing immunodeficiencies

SAMPLE SIZE :

- 96 based on sample size calculation
- $n=\frac{(Z_{\alpha}\, pq)}{d}$
- Z_{α} = 1.96
- P= 50 % prevalence of increased Ig E level and absolute eosinophil count
- q = 100 – p
- d = desired precision of prevalence+/- which implies 95% confidence limit for prevalence of IgE

MANOEUVRE :

Writtern informed consent is obtained from the parents of the study population

Ethical committee clearance obtained from institutional ethical committee.

Patient are classified as bronchiolitis clinically .Bronchiolitis is a clinical syndrome characterized by acute onset of respiratory symptoms in a child younger than 2 years of age. Typically the initial symptoms of upper respiratory tract viral infection such as fever and coryza progress within 4 -6 days to include the evidence of lower respiratory tract involvement with the onset of cough and wheezing

Datas on clinical symptoms as well as family history and environmental factors was obtained for all 96 children participating in the study. Structured proforma was used. Chest x ray and complete blood count taken for all patients

About 2 ml blood is drawn for Serum Ig E and is measured by electrochemiluminescence immunoassay .

Normal value of IgE :

0 to 1 year :0 to 15 IU/ml,

1 to 5 year: 0 to 60 IU/ml.

Absolute eosinophil count is done by direct method in which blood is diluted 10 times in WBC pipette with special diluting fluid which removes red cells and stains the eosinophils.

Principle : The eosinophil count is performed by diluting whole blood with a staining solution. The phyloxine B present in the diluting fluid stains only the eosinophils red; all other leukocytes are preserved but not stained. The diluted specimen is charged onto a hemacytometer for counting. Using the low-power (10x) objective, the eosinophils appear bright orange-red and are clearly distinguishable from neutrophils, basophils, lymphocytes, and monocytes, which do not stain.

The diluted blood specimen is then charged in a counting chamber and the cells are counted under high power objective. The population of eosinophils is then calculated for the undiluted blood . Less than 350 cells per microliter (cells/mcL) is considered normal.

Throat swab for RSV antigen is taken from posterior pharyngeal wall and transported to lab through viral transport medium using cold chain and is measured using Polymerase chain reaction

These patients are followed for a period of 1 year to find out the proportion of occurence of wheezing among the IgE positive patient. The patients were followed every two months with telephone call for occurrence of wheeze. Those with wheeze were also followed up for further recurrence.Results are analysed statistically.

OBSERVATION AND RESULTS

Analysis of the data collected has been done and statistical significance was established as discussed in following section

AGE DISTRIBUTION:

Of the 96 bronchiolitis patients, distribution based on age were analysed and the corresponding chart is shown as below.

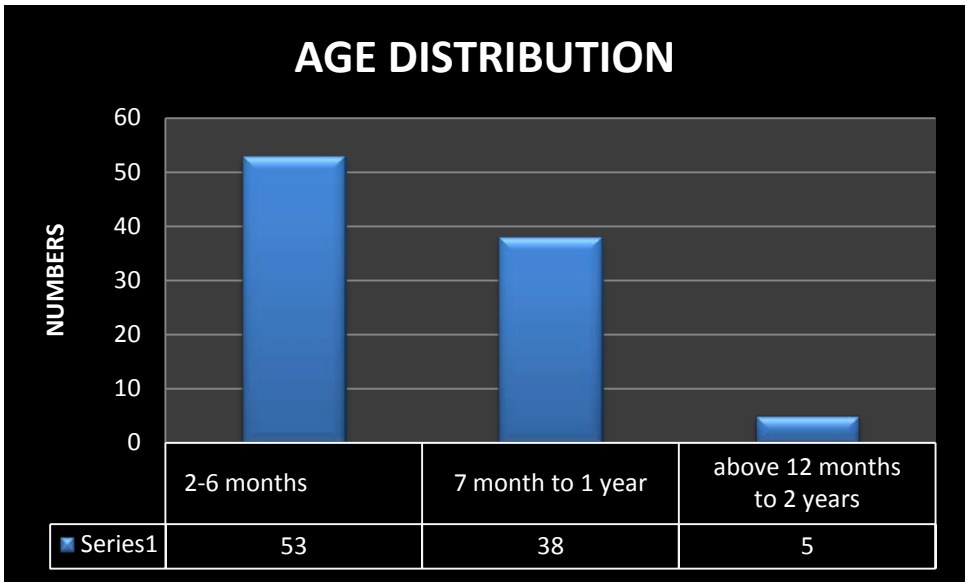


Figure 1. AGE DISTRIBUTION OF BRONCHIOLITIS

FIGURE 1 represent that out of 96 subjects 53 (55.2%) were in age group of 2 to 6 months which was majority followed by 7 months to 1 year with 38 patients and above 1 year with 5 patients

SEX DISTRIBUTION

Out of 96 patient who developed bronchiolitis 62% (60) were male and 38 %(36) were female, with male to female ratio of 5:3

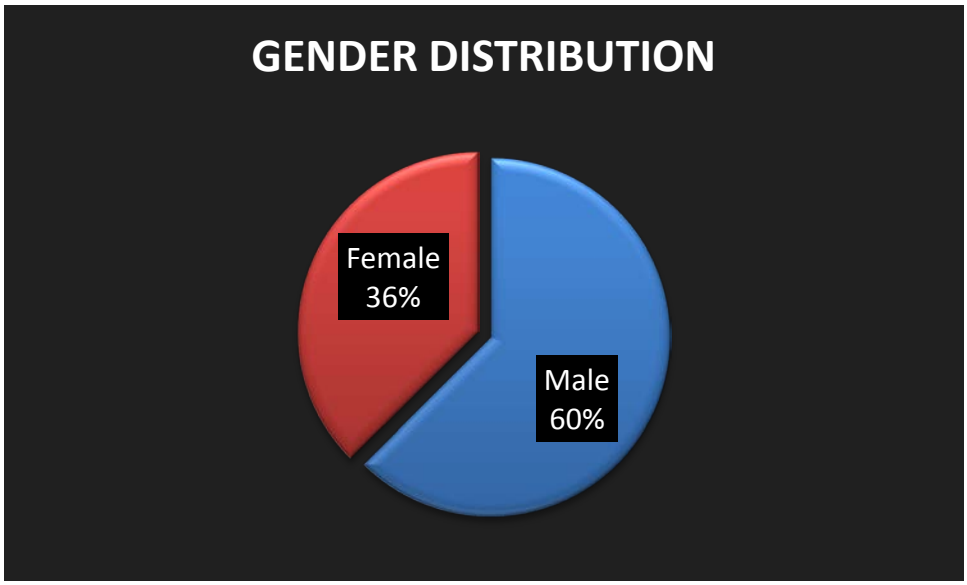


Figure 2: Sex distribution of bronchiolitis

PRESENTING COMPLAINTS:

Among the 96 bronchiolitis patient other than breathlessness which is invariably the presenting complaint the other complaints for which they presented are Rhinorrhoea(11.4%),fever (31.2%),cough(16.6%),aspiration (16.6%),poor feeding (7.2%),excessive sleepiness(8.3%),ear discharge(1%).

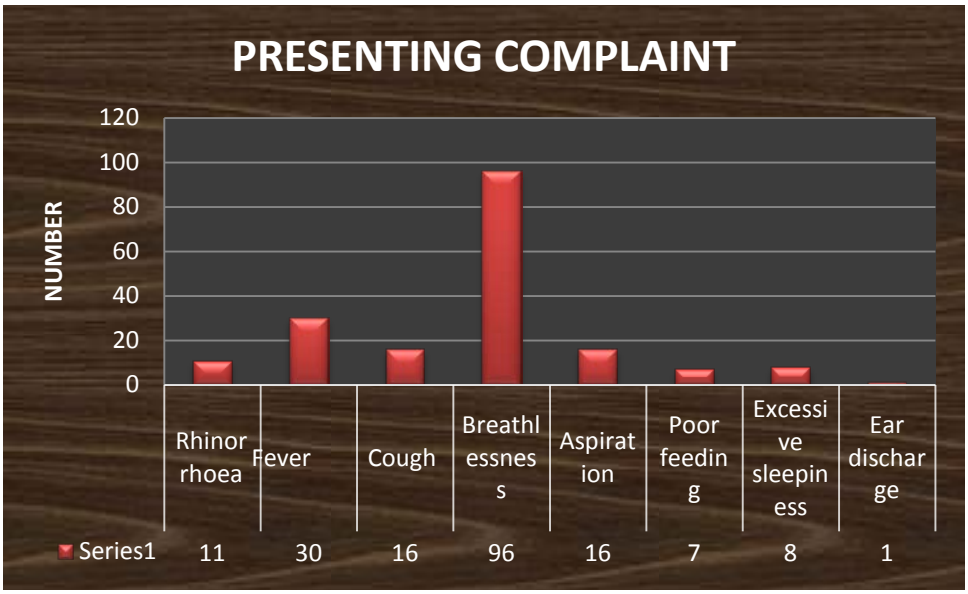


Figure 3: Presenting complaint of bronchiolitic patients

FINDINGS ON CHEST X RAY:

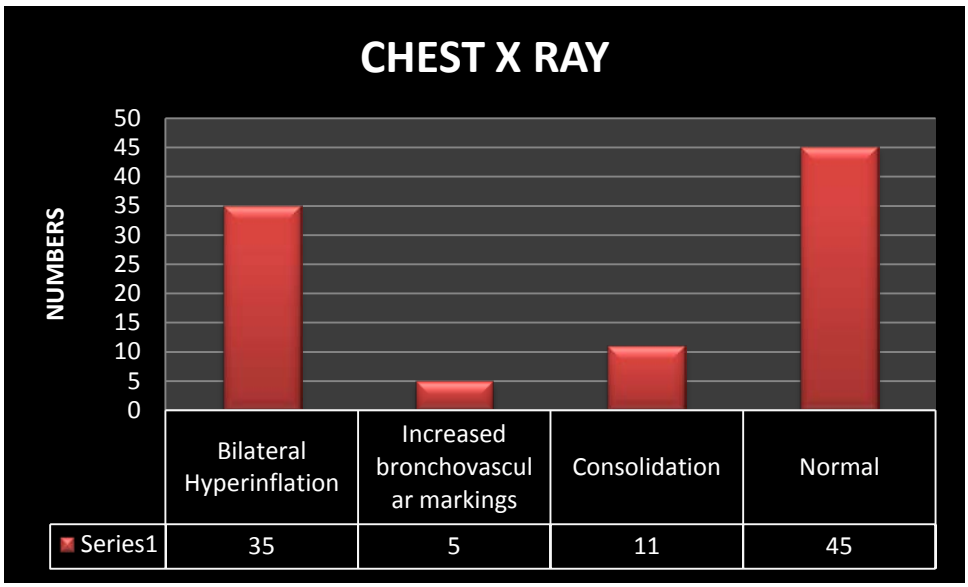


Figure 4: Findings on x ray chest

Though chest x ray is not an investigation recommended routinely in bronchiolitis, we took x ray to rule out other co morbidities. The findings are as follows. Among 96 subjects 45 patients showed normal x ray. 35 (36.4%) had hyperinflated lungs, 11(11.4%) had consolidation, 5(5.2%) showed increased bronchovascular markings.

ESTIMATION OF IgE LEVELS

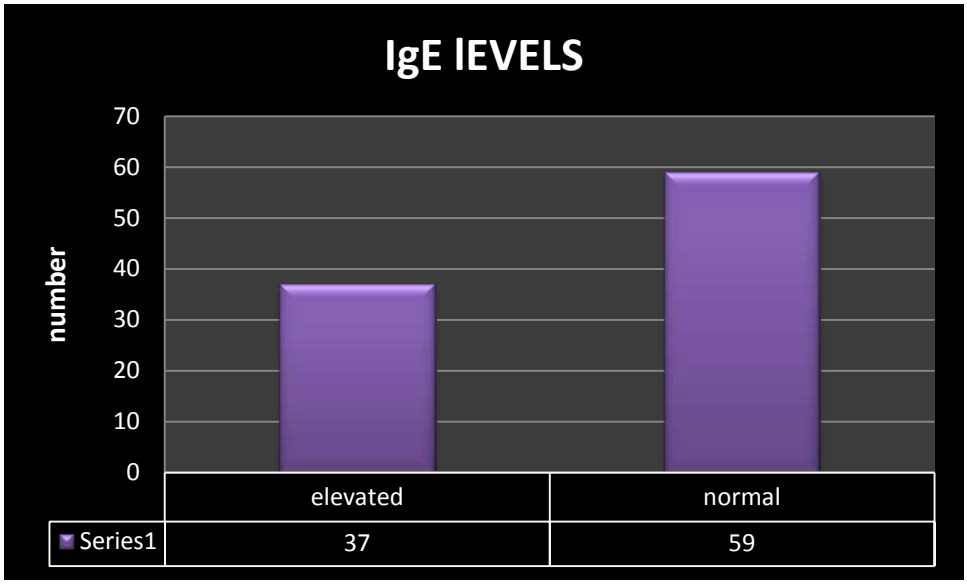


Figure 5: IgE levels in bronchiolitis subjects

As seen from above chart 37 out of 96 subjects had raised IgE which accounts for 38.5%, while the remaining had normal levels.

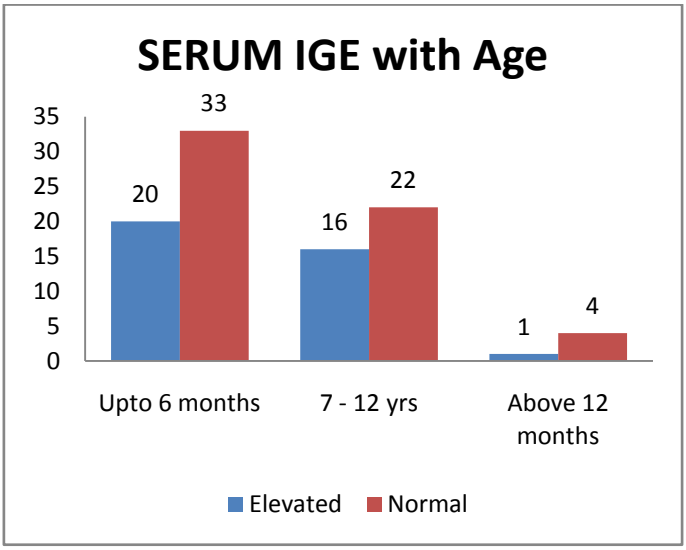


Figure 6: SERUM IgE with age

As seen in the above chart among 53 patients 20 had raised IgE levels in the age group of 2 to 6 months. In the age group of 7-12 months 16 had raised IgE levels and above 12 months 1 had raised IgE levels.

ABSOLUTE EOSINOPHIL COUNT:

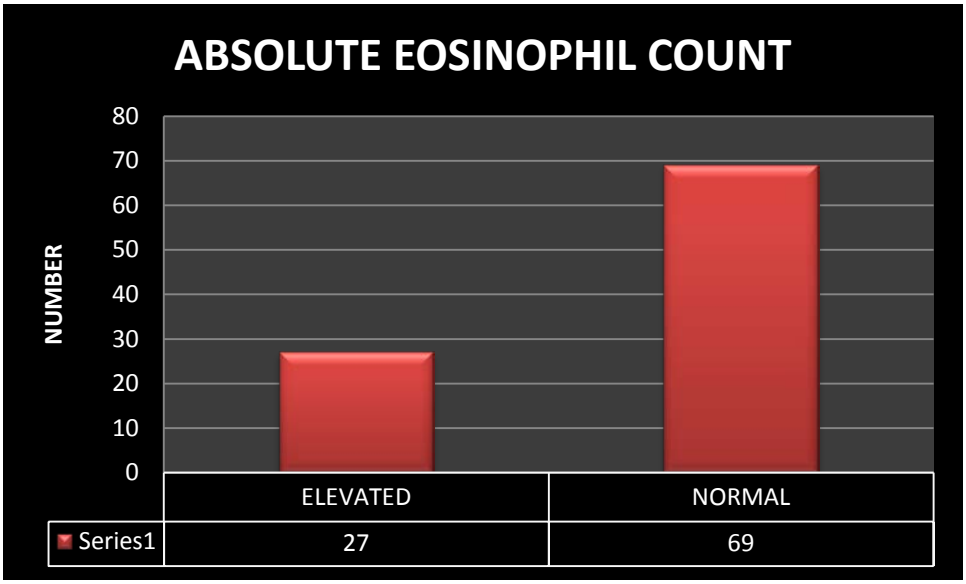


Figure 7: Absolute eosinophil count in bronchiolitis

As seen from the above chart out of 96 subjects 28.1% (27) had raised absolute eosinophil count levels .Rest 69 subjects had normal levels.

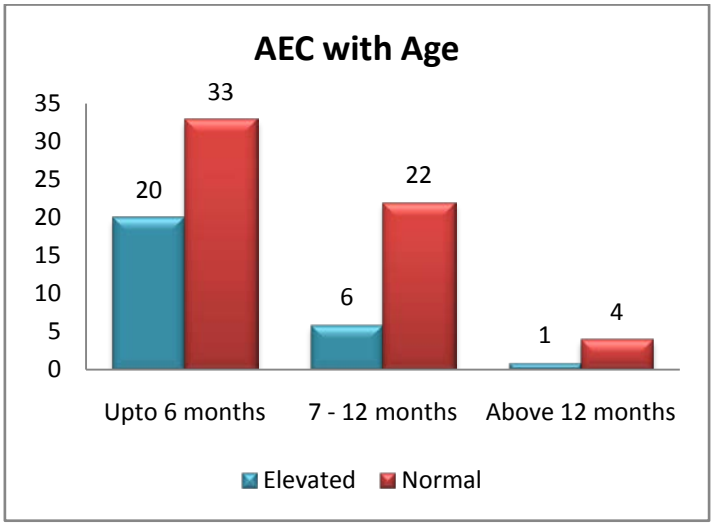


Figure 8 : Comparision of absolute eosinophil count with age

The above chart represents elevation of eosinophil count with age. As seen from above among 33 patients in less than 6 months 20 had raised levels and among age group of 7 to 12 months 6 had raised levels.

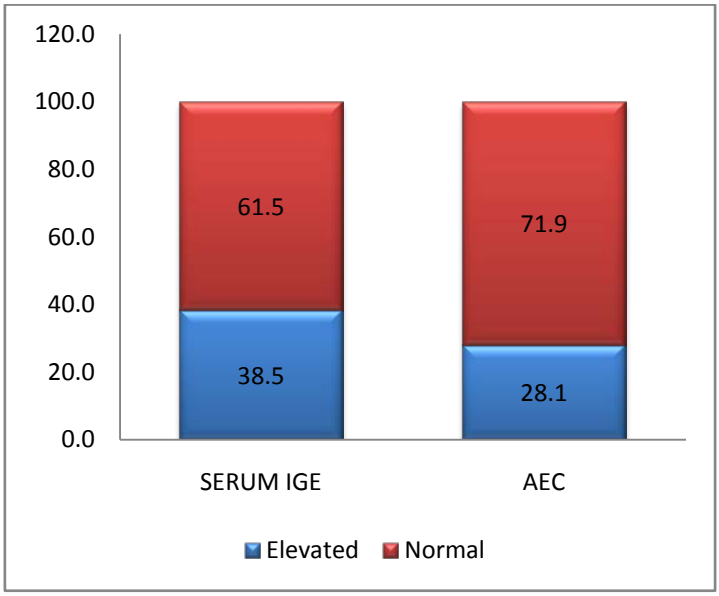


Figure 9: Percentage of IgE and Absolute eosinophil count

The above figure represent percentage of elevated IgE levels (38.5%)and eosinophil count (28.1%).

RSV AS AN ETIOLOGICAL AGENT IN BRONCHIOLITIS:

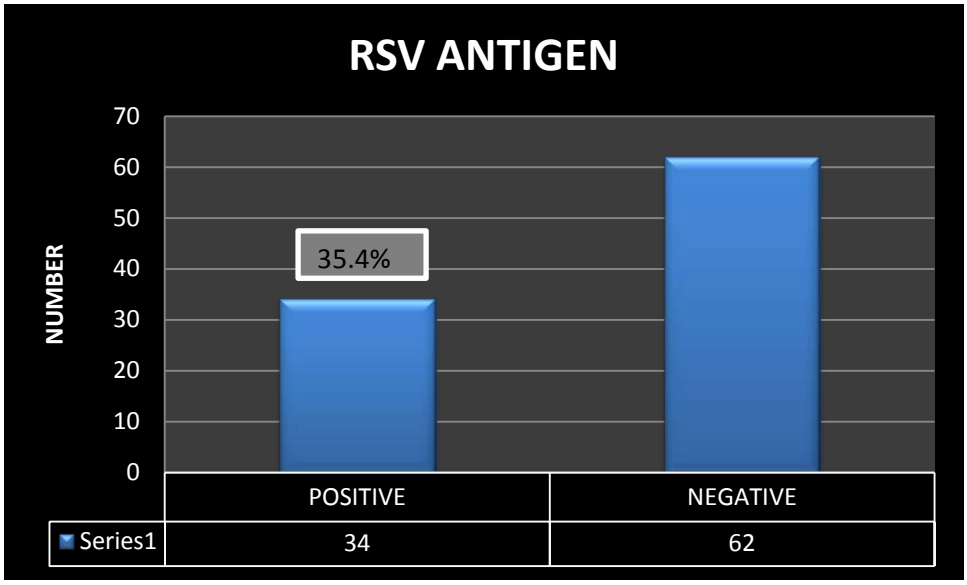


Figure 8: RSV positivity among bronchiolitic patients.

The above chart represent RSV positivity among bronchiolitis patient. Among 96 patient 34 (35.4%) had RSV PCR positive.

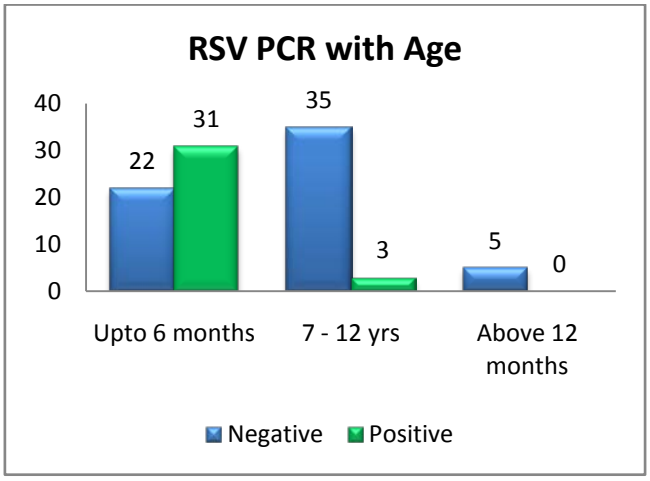


Figure 9: Relationship of RSV PCR with Age

As seen from above chart RSV is more common in age group upto 6 months forming 32% followed by 7-12 months with 3%

VIRAL BRONCHIOLITIS AND SUBSEQUENT WHEEZE:

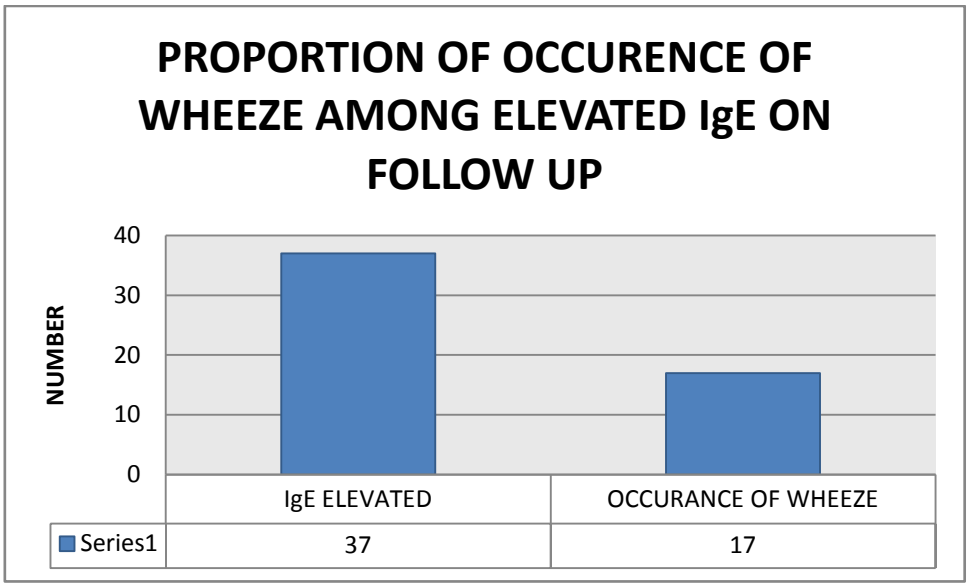


Figure 10: Proportion of occurence of wheeze among elevated IgE on revisit

From the above chart out of 37 subjects who had raised IgE Levels .Out of them 17 (45.9%) developed wheeze after bronchiolitis on one year follow up.

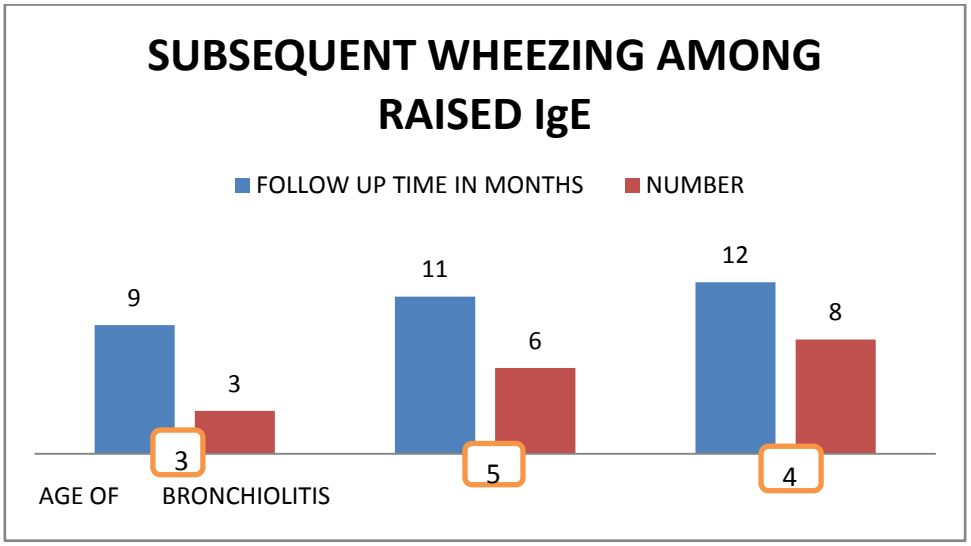


FIGURE 11: Subsequent wheezing following bronchiolitis with Raised IgE

As seen from the graph, this represent subsequent wheeze following bronchiolitis. (With raised IgE)out of 17 patients who developed wheeze 3 of them developed wheeze on 9 months of follow up (age of bronchiolitis 3 months), 6 on 11 months of follow up (age of bronchiolitis 5 months) and 8 on 12 months of follow up (age of bronchiolitis 4 months).

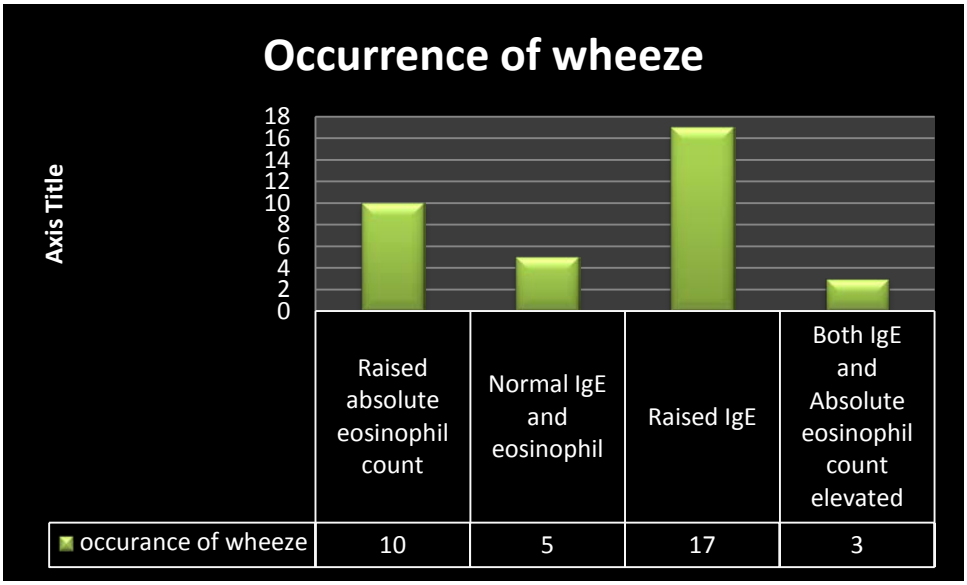


FIGURE 12: Occurrence of wheeze in bronchiolitis

This figure represents occurrence of wheeze among bronchiolitis children. Out of raised IgE levels in 37 patient 17 had wheeze. Among 27 raised absolute eosinophil levels 10 had wheeze on follow up. Among the bronchiolitis children with normal values of IgE and Absolute eosinophil count 5 had wheeze on follow up. Out of the subjects who have both IgE and absolute eosinophil count raised 3 had wheeze on follow up.

STATISTICAL ANALYSIS

The collected data was analysed with SPSS 16.0 version.To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables.To find the significance in categorical data Chi-Square test was used. In the above statistical tools the probability value 0.05 is considered as significant level.

P - Value	Highly Significant at P ≤ .01

P - Value	No Significant at P ≥ .05

CROSS TABULATION BETWEEN VARIOUS PARAMETERS AND DESCRIPTIVE STATISTICS

Frequency Table

FREQUENCY TABLE FOR AGE

Table 1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Upto 6 months	53	55.2	55.2	55.2
	7 - 12 Months	38	39.6	39.6	94.8
	Above 12 months	5	5.2	5.2	100.0
	Total	96	100.0	100.0	

From the above chart it is evident that bronchiolitis is more common in less than 6 months of age with cumulative percent of 55.2

FREQUENCY TABLE FOR GENDER

Table 2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	36	37.5	37.5	37.5
	Male	60	62.5	62.5	100.0
	Total	96	100.0	100.0	

As seen from the above table out of 96 members 36 were female and 60 were male. Their valid percent is female (37.5%) and male (62.5%)

PRESENTING COMPLAINTS

The following chart represents frequency table of presenting complaint.

KEY FOR CODES

Fever (1)

Rhinorrhoea (2)

Cough (3)

Breathlessness (4)

Poor feeding (5)

Aspiration (6)

Ear discharge (7)

Excessive sleepiness (8)

Congenital heart disease(9)

Table 3

Presenting complaint	Frequency	Percent	Valid Percent	Cumulative Percent
1,2,4	4	4.2	4.2	4.2
1,3,4	1	1.0	1.0	5.2
1,4	10	10.4	10.4	15.6
1,4,2	1	1.0	1.0	16.7
1,4,3	2	2.1	2.1	18.8
1,4,3,2	1	1.0	1.0	19.8
1,4,5,6	2	2.1	2.1	21.9
1,4,6	1	1.0	1.0	22.9
2,4	1	1.0	1.0	24.0
3,4	4	4.2	4.2	28.1
3,4,6,1,2	1	1.0	1.0	29.2
3,4,7	1	1.0	1.0	30.2
4,1	2	2.1	2.1	32.3
4,1,3	1	1.0	1.0	33.3
4,1,3,2	1	1.0	1.0	34.4
4,1,8,6	1	1.0	1.0	35.4
4,3	2	2.1	2.1	37.5

	Table3 (cont)			
Presenting complaint	Frequency	Percent	Valid Percent	Cumulative Percent
4,5,6	2	2.1	2.1	41.7
4,5,6,1	1	1.0	1.0	42.7
4,5,6,8,1	1	1.0	1.0	43.8
4,6	4	4.2	4.2	47.9
4,6,5,8	1	1.0	1.0	49.0
4,6,8	2	2.1	2.1	51.0
4,8	3	3.1	3.1	54.2
4.	44	45.8	45.8	100.0
Total	96	100.0	100.0	

FREQUENCY TABLE FOR SERUM IgE

Table 4

SERUM IGE

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Elevated	37	38.5	38.5	38.5
	Normal	59	61.5	61.5	100.0
	Total	96	100.0	100.0	

As seen from the above chart the valid percent of elevated IgE is 38.5 with normal values being 61.5

FREQUENCY TABLE FOR ABSOLUTE EOSINOPHIL COUNT

Table 5

AEC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Elevated	27	28.1	28.1	28.1
	Normal	69	71.9	71.9	100.0
	Total	96	100.0	100.0	

As seen from the above chart the valid percent of elevated absolute eosinophil count is 28.1 with normal absolute count being 71.9

FREQUENCY TABLE FOR RSV ANTIGEN

Table 6

RSV PCR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	62	64.5	64.5	64.5
	Positive	34	35.4	35.4	100.0
	Total	96	100.0	100.0	

As seen from the above chart the valid percent of RSV antigen being positive is 35.4 with negative value being 64.5

FREQUENCY TABLE FOR CHEST X RAY

Table 7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bilateral Hyperinflation	35	36.5	36.5	36.5
	Increased bronchovascular markings	5	5.2	5.2	41.7
	Consolidation	11	11.5	11.5	53.1
	Normal	45	46.9	46.9	100.0
	Total	96	100.0	100.0	

As seen from the above chart bronchiolitis patient had normal x ray with valid percent of 46.9 followed by hyperinflated x ray 36.5%

Descriptive

statistics

Table 8

Descriptive Statistics for age

	N	Minimum	Maximum	Mean	Std. Deviation
AGE IN MONTHS	96	2	19	6.92	3.346
Hb	96	10	15	12.33	1.092
Valid N (listwise)	96				

The above chart gives descriptive statistics for age with minimum occurance of bronchiolitis at 2 months of age and maximum occurance at 19 months of age, with mean age of 6.92

Table 9

Descriptive Statistics for female

	N	Minimum	Maximum	Mean	Std. Deviation
AGE IN MONTHS	36	3	15	7.06	2.985
Hb	36	10	14	11.97	1.055
Valid N (listwise)	36				

The above chart represents descriptive statistics for females with minimal occurance of bronchiolitis at 3 months and maximum at 15 months

Table 10

Descriptive Statistics for male

	N	Minimum	Maximum	Mean	Std. Deviation
AGE IN MONTHS	60	2	19	6.83	3.566
Hb	60	10	15	12.55	1.064
Valid N (listwise)	60				

The above chart represents descriptive statistics for males with minimal occurance of bronchiolitis at 2 months and maximum at 19 months

CROSS TABULATION BETWEEN VARIOUS PARAMETERS

Table 11

SERUM IGE * Age

CORELATION BETWEEN AGE DISTRIBUTION AND SERUM IgE

			Age			
			Upto 6 month	7 - 12 month	Above 12 months	Total
SERUM IgE	Elevate	Count	20	16	1	37
		% within Age	37.7%	42.1%	20.0%	38.5 %
	Normal	Count	33	22	4	59
		% within Age	62.3%	57.9%	80.0%	61.5 %
Total		Count	53	38	5	96
		% within Age	100.0%	100.0%	100.0 %	100.0 %

As seen from the above table out of 37 elevated IgE levels, 20 belong to 2-6 months and 16 of them fall under 7-12 months and one of them is above 1 year

Table 12 :Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.944[a]	2	.624
Likelihood Ratio	1.013	2	.602
N of Valid Cases	96		

To determine the significane of above categorical data, Pearson chi square test was performed. The calculated P value was 0.624 (>0.05). Hence serum IgE Levels with regards to age in study population has not been found to be statistically significant.

AEC * Age. Table 13

CROSS TABULATION BETWEEN ABSOLUTE EOSINOPHIL COUNT.

			Age			
			Upto 6 months	7 - 12 months	Above 12 months	Total
AEC	elevated	Count	11	11	5	27
		% within Age	20.8%	28.9%	100.0%	28.1%
	normal	Count	42	27	0	69
		% within Age	79.2%	71.1%	0.0%	71.9%
Total		Count	53	38	5	96
		% within Age	100.0%	100.0%	100.0%	100.0%

As seen from the above table among the 27 elevated absolute eosinophil count 11 were in age group 2-6 months and 11 were in 7-12 months and 5 above 12 months

Table 14

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.215	2	.001
Likelihood Ratio	14.212	2	.001
N of Valid Cases	96		

To determine the significance of above categorical data pearson chi square test was performed. The calculated P value was 0.001(0.01).H ence the correlation between age and absolute eosinophil count has been found to bear a high statistical significance.

RSV PCR * Age

Crosstabulation between RSV PCR and age

Table 15

			Age			
			Upto 6 months	7 – 12 months	Above 12 months	Total
RSV PCR	negative	Count	22	35	5	62
		% within Age	41.5%	92.1%	100.0%	64.5%
	positive	Count	31	3	0	34
		% within Age	58.5%	7.8%	0.0%	35.4%
Total		Count	53	38	5	96
		% within Age	100.0 %	100.0%	100.0%	100.0%

As seen from the above table RSV PCR was positive with 58.5% up within the age group of 2-6 months followed by 7.8% among 7 -12 months

Table 16: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.296[a]	2	.001
Likelihood Ratio	15.296	2	.000
N of Valid Cases	96		

To determine the significance for the above categorical data pearson chi square test was performed. The P value arrived was 0.001 (< 0.01). Hence the correlation between RSV antigen and age has been found to bear high statistical significance.

DISCUSSION

In our study ,the prevalence of raised Absolute eosinophil count was 28.1 % and IgE levels in bronchiolitis (38.5%) RSV antigen was 35.4 % as a causative factor and the proportion of occurance of wheeze among IgE Positive patient was 45.9%. The pathology of eosinophil activation and type 2 cytokine activated IgE production occurs whether the bronchiolitis is RSV positive or not.

PRESENTING COMPLAINTS IN BRONCHIOLITIS:

Among the 96 bronchiolitis patient other than breathlessness which is invariably the presenting complaint the other complaints for which they presented are rhinorrhoea(11.4%),fever (31.2%),cough(16.6%),aspiration (16.6%),poor feeding (7.2%),excessive sleepiness(8.3%),ear discharge(1%). Similar study was conducted by Losartales ,Maria et al [72]where they found 8.6% of RSV infection in outpatient department and 10.6% of those in inpatient department wit lower respiratory tract infection. In their study 59.7% had lower respiratory tract involvement.chest indrawing and increased respiratory rate was invariably present. Wheezing was infrequent. 4.6% had bacterial coinfection with low case fatality rate of 3.4%.

AGE DISTRIBUTION OF BRONCHIOLITIS:

The five year survey of admission due to bronchiolitis and RSV infection observed increased susceptibility of infants less than one year.[16] This is consistent with previous studies by Chatterjee et al,Siguris et al, willi et al, Jartti et al [(67,68)]in which bronchiolitis was associated with lower age group(2-6 months). In our study among 96 subjects 55% fell under 2 to 6 months, and 39% had bronchiolitis from seven to one year of life.

GENDER:

In our study out of 96 subjects bronchiolitis was more common in male (60%) compared to females. Similar result was given by Boezen HM, Jansen DF et al [96] boys had more risk of developing bronchiolitis than girls which may be due to smaller airway in males with decreased flow rate of air in lungs of boys. The immunosuppressive quality of androgen may be a contributing factor.

INCIDENCE OF RSV BRONCHIOLITIS:

Our study reported RSV infection of 35.4% and had high statistical significance. Similar studies were conducted by Soham gupta, Rajini et al[57] who reported RSV infection among 22 % of children. Yeolekar et al[59] reported 26% in west india. Bharaj et al [58]reported 22% and Broor et al[60] reported 30 % bronchiolitis with causative agent as RSV.

Chattopadhya et al [68]reported 54% of RSV infection aming bronchiolitis. According to Matti korppi ,villi et al [66] among his bronchiolitis subjects , 69.8 % of them had

RSV as viral etiology:

This table represents the prevalence of RSV in various studies (comparing our study)

Country	Study size	Prevalence of RSV	Age Group affected	Authors
Our study	96	35.4%	< 2 years	
AAP		50-60%		
India	131	54%	<2 years	Chattopadya, anand R et al [68]
Turkey	332	29.5%	< 2 years	Kanra et al 2005
UAE	252	28.6%	< 2 years	Uduman SA et al[64] 1993 - 1995
Lebaon	120	26.7%	< 6 years	Hamze A et al 2007-2008
Kuwait	1024	36.8%	<1 year	Khadada M. et al [61]2010

AAP- American academy of paediatrics.

To establish the diagnosis of RSV laboratory diagnosis is essential as clinical features overlap with other viral infection like Metapneumovirus. Early diagnosis establish timely intervention to be introduced to control the spread of disease.

We used amplification technique reverse transcriptase polymerase chain reaction (RT-PCR) This was supported by Javed Akthar et al[65].

CHEST X RAY IN BRONCHIOLITIS:

According to Javed Akthar et al [65]in bronchiolitis the usual chest x ray picture is hyperinflated lung fields with diffuse increase in interstitial markings. They also stated that 20- 25% of cases had atelectasis and pulmonary infiltrates. In our study 36% of those had hyperinflated lung fields and 44% showed normal x ray. 1% of them showed atelectasis and 11% of them had pulmonary infiltrates.

IgE LEVELS IN BRONCHIOLITIS AND OCCURENCE OF WHEEZE:

According to Stephen H. polmer et al[33] measured IgE levels in 32 subjects. In his study 35% of them had IgE levels above 95 th percentile and among 32 subjects 17 were RSV positive .In our study 38.5% had raised IgE levels and among 96 subjects 34 (35.4%) were RSV Positive. But it was statistically not significant.

Kostas N. Priftis, Athina Papadopoulou [89] conducted similar study. The aim of the study is to test whether serum IgE levels and eosinophil count are raised during acute bronchiolitis. They concluded that IgE levels did not raise significantly in study subjects compared to control subjects

Similar study by Wellivir et al [41],had 78 infants with RSV bronchiolitis .More than 25 subjects showed raised IgE level and among them 17 had wheeze on follow up. In our study among the raised IgE levels (37 subjects) 45% (17 subjects) of them acquired wheeze. Similar study was conducted by Siguris et al [28] positive IgE test was seen in 32% of RSV bronchiolitis and 23% of them developed wheeze.

Similar study was conducted by Susan P, Paelo et al[55] where they concluded that bronchiolitis is followed by activation of cellular response and early wheeze.They also documented increase in eosinophils. Willever sun et al [41]in their study predicted the high IgE levels at the time of bronchiolitis is predictive of wheeze. In their study about 70% had wheeze episodes after high level.

EOSINOPHILS IN BRONCHIOLITIS:

Kostas N. Priftis, Athina Papadopoulou [89] in their study concluded that eosinophil level raised slightly and significantly in bronchiolitis. This was similar to our study in which though the raise in eosinophil was low it was statistically significant.Another study by Oyamer et al [96] found raised eosinophil levels in RSV bronchiolitis than in non RSV group and also concluded that RSV caused more severe disease than other viruses. Dimova, Russel et al [56]reported 51 samples of raised eosinophil count among 77 bronchiolitis subjects. In our study 28.1% had raised eosinophil count and had high statistical significance.Similiar reports were given by Ehlenfield et al and Welliver et al, Dorris et al [85], Colochyo et al.

Prevention of bronchiolitis depends upon diagnosis,control of infection and hygiene and also by giving immunoprophylaxis[7] (Palivizumab, a genetically engineered humanized monoclonal antibody).This monoclonal antibody is considered for infants with chronic lung disease, born preterm or with congenital heart disease. Infants should not be exposed to passive smoking. Breast milk is recommended as it is immunoprotective and decrease the child's risk of having lower respiratory tract infection.

CONCLUSION

Bronchiolitis is most common respiratory infection in children less than 2 years. The host inflammatory response contribute to the pathophysiology of bronchiolitis.Most common long term complication is wheeze although the relation remains unclear.

The study thus conducted has illuminated us on the following facts about bronchiolitis.

With regard to the age distribution, higher incidence of bronchiolitis is seen in the infant population of 2 to 6 months .

Higher incidence is seen among the male population compared to females.

The prevalence of raised Absolute eosinophil count was 28.1 %. They were correlated with age and is found to have high statistical significance.

The prevalence of IgE levels in bronchiolitis (38.5%) but was not of any statistical significance.

RSV antigen as a causative factor was 35.4 % and had high statistical significance. The Occurence of wheeze was also analysed and was found to be statistically significant.

The proportion of occurence of wheeze among IgE Positive patient was 45.9% . Out of raised IgE levels in 37 patient 17 had wheeze. Among 27 raised absolute eosinophil levels 10 had wheeze on follow up. Among the bronchiolitis children with normal values of IgE and Absolute eosinophil count 5 had wheeze on follow up. Out of the subjects who have both IgE and absolute eosinophil count raised 3 had wheeze on follow up.

LIMITATION OF STUDY

- The lack of control group without bronchiolitis for comparision is not done.
- The comparision between different viral group as a cause of bronchiolitis is not done
- The analysis of coinfection is not done
- Time period for follow up for wheeze is limited.

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SERUM IGE LEVELS AND ABSOLUTE EOSINOPHIL COUNT IN CHILDREN WITH BRONCHIOLITIS

PROFORMA

NAME:

AGE:

SEX:

HISTORY:

PRESENTING ILLNESS:

	PRESENT	**ABSENT**
FEVER		
RHINORRHOEA		
COUGH		
BREATHLESSNESS		
POOR FEEDING		
ASPIRATION		
EAR DISCHARGE		
EXCESSIVESLEEPINESS		
CONGENITAL HEART DISEASE		

ALLERGIC HISTORY :	**PRESENT**	**ABSENT**
PRECIPITATING FACTORS		
URI		
CHOCOLATE		
CHILLED FOOD		
FRUITS /NUTS		
ENVIRONMENTAL POLLUTION		
PARENTRAL SMOKING		
SOCIOECONOMIC STATUS:		
OVERCROWDING		
DAMP AND COLD HOUSING		
PAST HISTORY :		
ANY SIMILIAR ILLNESS IN THE PAST		
IF YES HOW MANY EPISODES SO FAR		
BIRTH HISTORY :		
PREMATURITY		
BREAST FEEDING		

FAMILY HISTORY OF ATOPY /EZCEMA/ASTHMA:

EXAMINATION:	**PRESENT**	**ABSENT**
NUTRITIONAL STATUS		
FEBRILE		
PALLOR/ICTERUS/CYANOSIS		
LYMPH NODE ENLARGEMENT		
VITALS		
RR		
HR		
SPO2		
PERIPHERIES		
RS EXAMINATION:		
CHEST WALL DEFORMITY		
INCREASED WORK OF BREATHING		
WHEEZE		
CRACKLES/CREPTS		
APNOEA		
CVS		
P/A		
CNS		

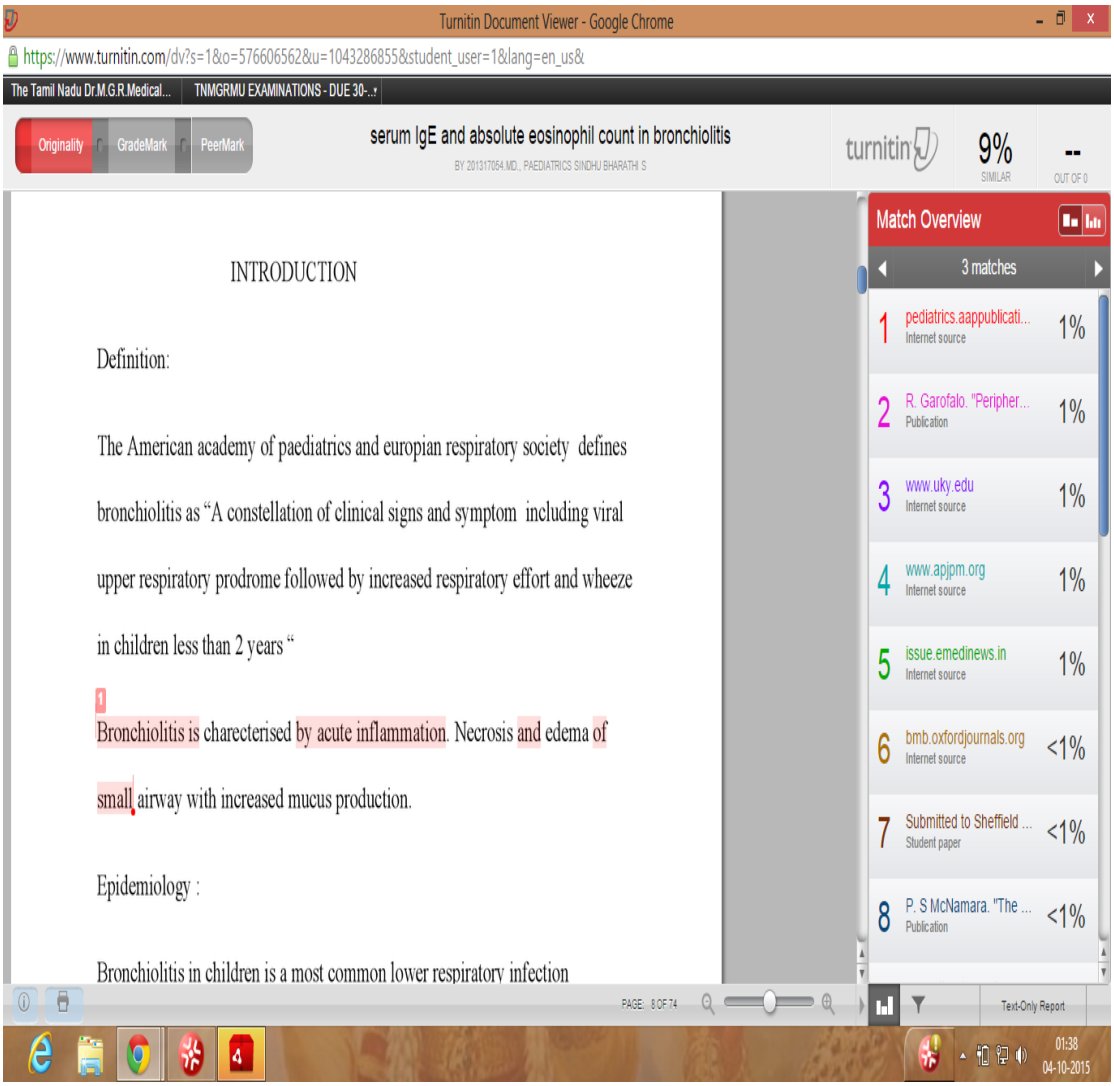
LAB INVESTIGATIONS	VALUES	INFERENCE
SERUM IGE		
ABSOLUTE EOSINOPHIL COUNT		
RSV ANTIGEN		
CHEST X RAY		

FOLLOW UP:

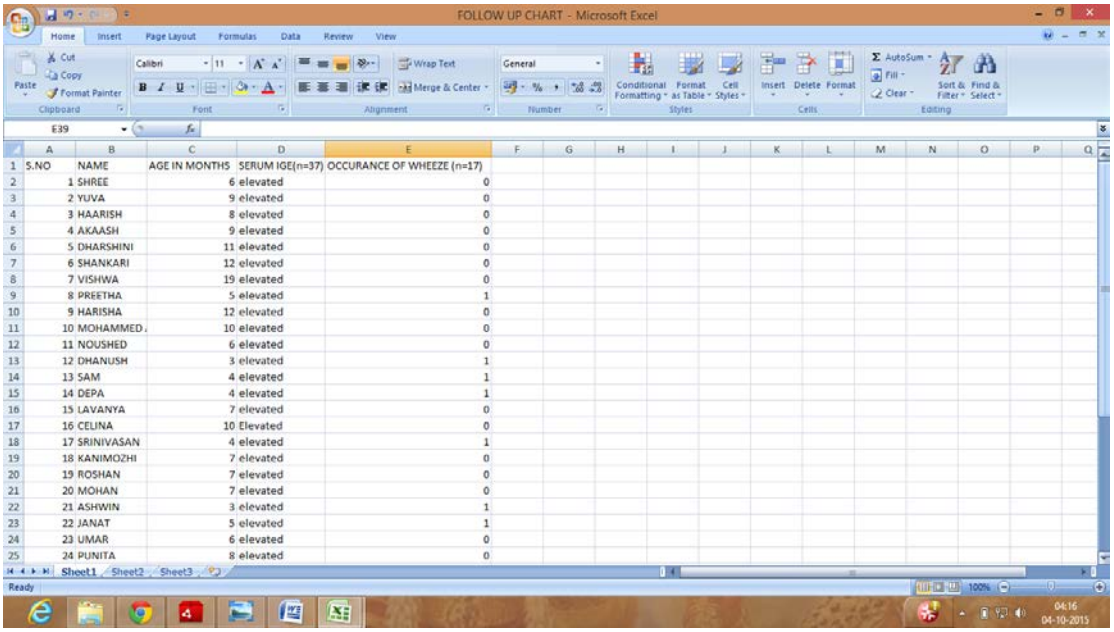
CONTACT DETAILS

H/O BREATHLESSNESS		
EPISODIC		
H/O RECURRANT NEBULISATION		

ORIGINALITY SCREEN SHOT



Follow up Chart



S.NO	NAME	AGE IN MONTHS	SERUM IGE(n=37)	OCCURANCE OF WHEEZE (n=17)
1	SHREE	6	elevated	0
2	YUVA	9	elevated	0
3	HAARISH	8	elevated	0
4	AKAASH	9	elevated	0
5	DHARSHINI	11	elevated	0
6	SHANKARI	12	elevated	0
7	VISHWA	19	elevated	0
8	PREETHA	5	elevated	1
9	HARISHA	12	elevated	0
10	MOHAMMED	10	elevated	0
11	NOUSHED	6	elevated	0
12	DHANUSH	3	elevated	1
13	SAM	4	elevated	1
14	DEPA	4	elevated	1
15	LAVANYA	7	elevated	0
16	CELINA	10	Elevated	0
17	SRINIVASAN	4	elevated	1
18	KANIMOZHI	7	elevated	0
19	ROSHAN	7	elevated	0
20	MOHAN	7	elevated	0
21	ASHWIN	3	elevated	1
22	JANAT	5	elevated	1
23	UMAR	6	elevated	0
24	PUNITA	8	elevated	0
25	PRIYAN	7	elevated	0
26	AKILAN	5	elevated	1
27	RAJASEKAR	5	elevated	1
28	VASANTH	4	elevated	1
29	NETHRA	4	elevated	1
30	SRIKANTH	7	elevated	0
31	MEHER	4	elevated	1
32	JAYA	9	elevated	0
33	SATHYA	5	elevated	1
34	MALARVIZHI	3	elevated	1
35	SUNDARI	5	elevated	1
36	MAGESH	4	elevated	1
37	GIRI	5	elevated	1

சுய ஒப்புதல் படிவம்

ப்ராங்கியோலைடிஸ் நோயில் இமினோகுலோபுலின் 'இ' மற்றம் முழுமையான ஈயோசினோபில் எண்ணிக்கை அறிதல்

ஆய்வாளர் : **செ.சிந்துபாரதி**
முதுநிலை பட்டமேற்படிப்பு மாணவர்
குழந்தை நலத்துறை

வழிகாட்டி : **பேராசிரியர் மரு.சாந்தி.எஸ்**
குழந்தை நலத்துறை
அரசு ஸ்டான்லி மருத்துவமனை

பங்கு பெரும் நோயாளியின்
பெயர் : வயது : உள்ளிருப்பு எண். :

இந்த மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை தீர்க்கவும் அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது.

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலும் எந்த கட்டத்திலும் எந்த சட்ட சிக்கலும் இன்றி இந்த ஆய்விலிருந்து விலகிக் கொள்ளலாம் என்று அறிந்து கொண்டேன்.

நான் ஆய்விலிருந்து விலகிக்கொண்டாலும் ஆய்வாளர் என்னுடைய மருத்துவ அறிக்கைளை பார்ப்பதற்கோ அல்லது உபயோகிக்கவோ என் அனுமதி தேவையில்லை எனவும் அறிந்து கொண்டேன். என்னை பற்றிய தகவல்கள் ரகசியமாக பாதுக்காக்கப்படும் என்பதையும் அறிவேன்.

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும் பரிசோதனை முடிவுகளையும் ஆய்வாளர் அவர் விருப்பதிற்கேற்ப பயன்படுத்திக் கொள்ளவும் அதனை பிரசுரிக்கவும் முழுமனதுடன் சம்மதிக்கிறேன்.

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்டுள்ள அறிவுரைகளின்படி நடந்து கொள்வதுடன் ஆய்வாளருக்கு உண்மையுடன் இருப்பேன் என்றும் உறுதி அளிக்கிறேன்.

உடல்நலம் பாதிக்கப்பட்டலோ வழக்கத்திற்கு மாறான நோய்குறி தென்பட்டாலோ அதனை தெரிவிப்பேன் என்று உறுதி கூறுகிறேன்.

இந்த ஆய்வில் எனக்கு எவ்விதமான பரிசோதனைகளையும் சிகிச்சைகளையும் மேற்கொள்ள நான் முழுமனதுடன் சம்மதிக்கிறேன்.

இப்படிக்கு

நோயாளியின் கையொப்பம் ஆய்வாளரின் கையொப்பம்

(பெயர்)

நோயாளி தகவல் தாள்

ப்ராங்கியோலைடிஸ் நோயில் இமினோகுலோபுலின் 'இ' மற்றம் முழுமையான ஈயோசினோபில் எண்ணிக்கை அறிதல்

ஆராய்ச்சியின் நோக்கமும், ஆதாயங்களும்.

ப்ராங்கியோலைடிஸ் நோயில் சுவாசக்குழாயில் சிறிய காற்று வழிப்பாதைகளை பாதிக்கிறது. இது சிறுகுழந்தைகளுக்கு மூச்சுதிணறலை ஏற்படுத்துகிறது. இந்நோயால் பாதிக்கப்பட்டவர்களில் இமினோகுலோபுலின் இ மற்றும் முழுமையான ஈயோசினோவில் எண்ணிக்கை அறந்து இவை அதிகமாக இருந்தால் பிற்காலத்தில் மூச்சுத்திணறல் வரக்கடும் என்று ஆய்வுகள் தெரிவிக்கின்றன.

ஆய்வுமுறை :

எனது ஆராய்ச்சியில் ப்ராங்கியோலைடிஸ் உள்ள குழந்தைகளுக்கு இமினோகுலோபுலின் 'இ' மற்றும் முழுமையான ஈயோசினோபில் எண்ணிக்கை எவ்வளவு என்று அறியப்படும்.

உண்டாகக்கூடிய இடர்கள் :

இந்த ஆய்வியில் 3 மில்லி இரத்தம் பரிசோதனைக்கு அனுப்பப்படுகிறது. இதனால் குழந்தைகளுக்கு தீங்கு இல்லை.

ஆய்வில் உங்கள் உரிமைகள் :

உங்கள் மருத்துவ பதிவேடுகள் அந்தரங்கமாக வைத்துக் கொள்ளப்படும். இந்த ஆய்வின் முடிவுகள் அறிவியல் பத்திரிக்கைகளில் வெளியிடப்படலாம். இதனால் நீங்களோ உங்கள் பெயரோ வெளியிடப்படாது. ஆய்வில் பங்கேற்பது தன்னிச்சையானது மற்றும் காரணங்கள் எதுவும் கூறாமலேயே நீங்கள் எப்போது வேண்டுமென்றாலும் விலகிக் கொள்ளலாம். ஏதேனும் பக்க விளைவுகள் ஏற்பட்டால் முழு சிகிச்சையும் மருத்துவ குழுவினரால் உடனடியாக வழங்கப்படும்.

நாள் :

நோயாளியின் கையொப்பம்
(அல்லது) இடது பெருவிரல் ரேகை
(மருத்துவரால் படித்து காட்டாப்பட்டது)

S.NO	NAME	AGE IN MONTHS	SEX	PRESENTING COMPLAINTS	Hb	TC	DC	SERUM IGE(n=37)	AEC(n=27)	RSV PCR(n=34)	CXR	occurrence of wheeze on follow up(n=29)
1	SHREE	6	F	4,6	10.8	7500	P70L30	elevated	normal	positive	1	0
2	PREETI	15	F	1,2,4	9.8	11000	P30L62E8	normal	elevated	negative	4	0
3	NITIN	12	M	1,2,4	11.2	6200	P58L38E4	normal	elevated	negative	4	0
4	KARPAGAM	6	F	4,5,6	13	11000	P64L32E4	normal	elevated	positive	4	0
5	YUVA	9	M	4	12.3	10000	P60L40	elevated	normal	negative	5	0
6	HAARISH	8	M	4	10.7	4600	P70L30	elevated	normal	negative	5	0
7	AKAASH	9	M	4	13	8600	P64L36	elevated	elevated	negative	5	0
8	DHARSHINI	11	F	4,1,3	9.8	7000	P62L38	elevated	normal	negative	1	0
9	PRADEEP	7	M	4	12.4	9000	P68L32	normal	normal	negative	5	1
10	PONMALAR	8	F	4	13.4	7500	P54L46	normal	normal	negative	5	0
11	ALBERT	5	M	4,3	12.4	12000	P54L42E4	normal	elevated	negative	1	1
12	SHANKARI	12	F	1,4,2	9.6	9400	P54L44E2	elevated	elevated	negative	5	0
13	RAJASEKAR	11	M	1,4	12.9	4600	P60L40	normal	normal	negative	5	0
14	ABINAYA	2	M	4	13.4	5780	P58L38E2	normal	normal	positive	1,3	1
15	VISHWA	19	M	1,4,3,2	10.1	11000	P56L44E2	elevated	elevated	negative	5	0
16	ROHIT	12	M	1,4	12.6	4900	P56L40E4	normal	elevated	negative	5	0
17	MAGESH	16	M	4,3,2	13	6700	P58L38E4	normal	elevated	negative	5	0
18	PREETHA	12	F	4,1,3,2	11.5	12700	P60L38E2	elevated	normal	negative	4	1
19	NAVEEN	14	M	4,3,2	13	10000	P66L34	normal	elevated	negative	5	0
20	IRFAN	8	M	4	14	6500	P74L26	normal	normal	negative	5	0
21	HARI	8	M	4	13	4900	P68L32	normal	normal	negative	5	0
22	HARISHA	5	F	4,3	12.4	7800	P38L60E2	elevated	normal	positive	1	0
23	MOHAMMED A	10	M	1,4,3	13.5	12000	P54L42E4	elevated	elevated	negative	4	0
24	KANDAN	6	M	4,6,8	12.6	10000	P54L46	normal	normal	negative	5	1
25	PRASAD	9	M	4	12.6	8700	P60L40	normal	normal	positive	1	0
26	NOUSHED	6	M	4	13.6	4800	P70L30	elevated	normal	negative	1	0
27	KAMESH	4	M	4	12.6	4300	P58L40E2	normal	normal	positive	5	1
28	MAHA	7	F	1,4	12.4	9000	P54L44E4	normal	elevated	negative	5	1
29	DHANUSH	3	M	4	13.2	7600	P58L38E2	elevated	normal	positive	1	1
30	BRINDHA	6	F	4	12.4	5600	P56L40E2	normal	normal	negative	3	0
31	SARAN	6	M	4,1	12.5	5400	P48L52	normal	normal	positive	5	0
32	SAM	4	M	4	13.5	7900	P70L30	elevated	normal	negative	1	1
33	ROOKAYA	3	F	4,6	12.6	6900	P74L26	normal	normal	positive	1	0
34	LOGESH	5	M	4	12.8	5800	P68L32	normal	normal	positive	5	1
35	PARI	4	M	4	13.8	5400	P64L36	normal	normal	positive	1	0
36	ESHWARAN	5	M	4	12.4	9500	P62L38	normal	normal	positive	1	0
37	GOWRI	10	F	1,4,3	13.4	9900	P54L44E2	normal	elevated	negative	5	0
38	VANI	5	F	1,4	12.5	7600	P74L26	normal	elevated	positive	5	1
39	DEPA	4	F	4	11.4	5600	P58L40E2	elevated	normal	negative	5	1
40	PREM	6	M	4	12.5	6700	P56L40E4	normal	elevated	positive	5	1
41	VANDANA	4	F	4	13.4	8700	P54L44E2	normal	normal	positive	1	0
42	ANAND	6	M	1,4	11	9000	P66L34	normal	normal	negative	5	0
43	JOHN	3	M	4	13	5700	P74L26	normal	elevated	positive	3	1
44	LAVANYA	7	F	4	12.5	5900	P68L32	elevated	normal	negative	5	0
45	JESSY	3	F	1,4	13.4	4800	P38L60E2	normal	normal	positive	1	0
46	SUBU	6	F	4	12.4	6700	P54L42E4	normal	normal	negative	3	0
47	DEVAND	4	M	4	13.4	7800	P54L46	normal	normal	positive	1	0
48	CELINA	10	F	4	11.8	5600	P60L40	Elevated	normal	negative	5	0
49	JUSTIN	6	M	4	13.2	4900	P70L30	normal	normal	negative	5	0
50	ANITHA	9	F	1,4	12.5	10100	P58L40E2	normal	normal	negative	5	0
51	SRINIVASAN	4	M	4	13.9	7000	P54L44E4	elevated	normal	positive	1	1

52	KANIMOZHI	7	F		4	13.6	5300	P58L38E2	elevated	normal	negative		5	0
53	MEIANA	9	F	4,1		11.4	12100	P56L40E2	normal	normal	negative		1	0
54	ROSHAN	7	M		4	12.6	7800	P48L52	elevated	normal	negative		5	0
55	MALARVIZHI	12	F	1,2,4		12.7	11000	P70L30	normal	elevated	negative		5	0
56	THIRU	5	M		4	12.5	8900	P74L26	normal	normal	negative		5	0
57	PAVI	11	M	1,2,4		11.4	4600	P68L32	normal	normal	negative		5	0
58	MARAN	7	M		4	13.5	5670	P64L36	normal	normal	negative		5	0
59	MOHAN	7	M		4	12.8	5400	P54L44E4	elevated	normal	positive		5	0
60	ASHWIN	3	M	4,1,8,6		13.6	11900	P58L38E2	elevated	normal	positive	2,4		1
61	JANAT	5	M	1,4,5,6		12.8	12800	P56L40E2	elevated	normal	negative		4	1
62	FIRDOSE	15	M	3,4,6,1,2		11.3	10200	P48L52	normal	elevated	negative		4	0
63	TAFIQ	11	M	3,4		12.4	9000	P70L30	normal	normal	negative		5	0
64	MANISH	9	M		4	13.4	6800	P74L26	normal	normal	negative		5	0
65	UMAR	6	M		4	12.5	4500	P68L32	elevated	normal	negative		5	0
66	PUNITA	8	F	3,4		12.5	5600	P64L36	elevated	normal	negative		5	0
67	KEVIN	5	M		4	14.6	6500	P62L38	normal	elevated	positive		1	1
68	PRIYAN	7	M	2,4		11.4	7500	P54L44E2	elevated	normal	negative		5	0
69	ARASU	9	M		4	13.4	8600	P74L26	normal	normal	negative		5	0
70	AKILAN	5	M	1,4		12.4	5400	P58L40E2	elevated	elevated	negative		5	1
71	OVIYA	5	F		4	12.6	4700	P56L40E4	normal	normal	positive		1	0
72	MOHAMED	2	M	4,5,6,1		12.6	11200	P54L44E2	normal	elevated	positive		4	0
73	RAJASEKAR	5	M	4,8		13.6	5600	P54L42E4	elevated	elevated	positive		1	1
74	VASANTH	4	M	4,8		11.4	6700	P54L44E2	elevated	normal	negative		5	1
75	JANARTH	2	M	4,8		11.6	7800	P60L40	normal	normal	negative		1	0
76	BAVANI	10	F	3,4,7		9.8	10700	P58L38E2	normal	elevated	negative		1	0
77	NETHRA	4	F	4,6		10.8	8700	P56L44E2	elevated	normal	negative		1	1
78	UYUGENDRAN	10	M	3,4		9.9	6700	P56L40E4	normal	normal	negative		1	0
79	SRIKANTH	7	M	1,4		12.5	5800	P58L38E4	elevated	normal	positive		5	0
80	CHANDRA	5	F	1,4		11.4	4500	P60L38E2	normal	elevated	positive		1	1
81	MEHER	4	M	4,6		13.3	6700	P66L34	elevated	normal	positive		1	1
82	LEKHA	5	F	1,4,6		11.4	4100	P74L26	normal	normal	negative		1	0
83	MANOJ	7	M	3,4		13.4	5800	P68L30E2	normal	elevated	positive		1	0
84	JAYA	9	F	1,3,4		12.5	4500	P38L60E2	elevated	elevated	positive		1	0
85	SATHYA	5	F		4	13.4	6800	P54L42E4	elevated	normal	negative		5	1
86	PRAKASH	5	M		4	12.4	5400	P54L46	normal	normal	positive		1	0
87	CHANDRAN	6	M		4	12.7	5690	P60L40	normal	normal	negative		5	0
88	ALAGU	5	F		4	11.4	6400	P74L26	normal	normal	negative		1	0
89	ISAI	5	F	1,4,5,6		12.7	12300	P68L32	normal	normal	positive		4	0
90	MALARVIZHI	3	F	4,5,6,8,1		12.8	11000	P64L32E4	elevated	elevated	positive		4	1
91	SUNDARI	5	F	4,6,8		11.9	9800	P62L38	elevated	normal	negative		3	1
92	MAGESH	4	M		4	12.5	6300	P54L44E2	elevated	normal	negative		1	1
93	SETHU	8	F		4	13.1	4700	P74L26	normal	normal	negative		1	0
94	JACOB	3	M	4,6,5,8		11.3	11300	P58L40E2	normal	normal	positive		1	0
95	GIRI	5	M	4,5,6		12.5	12700	P56L40E4	elevated	normal	negative		3	1
96	ANISH	3	M		4	12	6400	P54L44E2	normal	normal	negative		1	0

INSTITUTIONAL ETHICAL COMMITTEE, STANLEY MEDICAL COLLEGE, CHENNAI-1

Title of the Work : Prevalence of raised lgE levels and absolute eosinophil Count in bronchiolities in children aged 2 months to 2 years in tertiary health centre in Stanley Hospital, Chennai- 01.

Principal Investigator : Dr. Sindhu Bharathi. S

Designation : PG in MD (Paediatrics)

Department : Department of Paediatrics
Government Stanley Medical College,
Chennai-01

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 05.08.2014 at the Council Hall, Stanley Medical College, Chennai-1 at 2PM

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI

MEMBER SECRETARY
ETHICAL COMMITTEE,
STANLEY MEDICAL COLLEGE
CHENNAI-600 001.

KEY TO MASTER CHART

PRESENTING COMPLAINTS:

Fever (1)

Rhinorrhoea (2)

Cough (3)

Breathlessness (4)

Poor feeding (5)

Aspiration (6)

Ear discharge (7)

Excessive sleepiness (8)

Congenital heart disease(9)

CHEST X RAY :

Bilateral Hyperinflation (1)

Atelectasis (2)

Increased bronchovascular markings(3)

Consolidation (4)

Normal (5)

PRECIPITATING FACTORS;

No factors (0)

Upper respiratory tract infection (1)

Chocolate (2)

Chilled food(3)

Fruit / nuts (4)

PARENTAL SMOKING:

Yes (1)

No (0)

FAMILY HISTORY OF ATOPY :

Yes (1)

No (0)

OCCURANCE OF WHEEZE:

Yes (1)

No (0)